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PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Technical Services Division of the Office of Pesticide Programs, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

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79-0251. Ghataka, S.; Turner, R. K. (Dep. Econ., Univ. Leicester, Leicester, England) **Pesticide use in less developed countries.** *Food Policy* 3(2): 136-146; 1978. (28 references)

This paper reviews the advantages and disadvantages of increasing the use of pesticides in less developed countries (LDC), and discusses some of the political implications for more developed countries. It has been estimated that the LDC the food lost to pests and disease on the stalk and in storage can reach 40%. While the use of pesticides can clearly have a direct advantage in these countries, the following adverse effects must be weighed: build-up of pesticide residues, development of strains of resistant pests, the impact of pesticdes on non-target organisms (including man), and adverse effects on the plant crops themselves. Other factors to be considered are the relatively high cost of pesticides for poor countries and the possibility that use of pesticides may decrease employment, a disadvantage in LDC. In general, the authors suggest that other improvements such as improved irrigation and fertilizer, and better seeds, may have a more desirable effect in LDC than increased use of pesticides.

79-0252. Brian, R. C. (Imp. Chem. Ind., Jeolott's Hill Res. Stn., Berkshire, England) **The history and classification of herbicides.** In: *Herbicides: Physiology, Biochemistry and Ecology.* Audus, L. J. (London:Academic Press): 1:1-54; 1976. (193 references)

In this review, the development of herbicides, their application and relative effectiveness are discussed, including all classes of organic and inorganic compounds. A lengthy and complete table is presented which gives the structure of each herbicide, the solvent in which it will dissolve, the type of action (ie., uptake by roots, local action following uptake by foliage, or translocation following uptake by foliage), as well as both the common and scientific names.

79-0253. Anonymous **Joint project to develop new pesticides.** *Indian Chem. J.* 12(12): 44; 1978.

Joint projects are underway in India to develop new pesticides in order to make these available to the nation at lower prices than is currently possible. At present, foreign companies operate in India by importing all necessary intermediates and making the price for the finished product very high. The project to produce their own pesticides has been underway for three years with some good results. Pesticide technology has advanced significantly and several new pesticides and old ones are under study. Among the pesticides, herbicides and fungicides now under development are monocrotophos, carbofuran, diazinon, propoxur, quinalphos, DDVP, dursban, naled, phosgene-based herbicides and additional work on formulations, such as time release, flowable, synergist and stabilized formulation production. Toxicological studies are being carried out as well on the new formulations and chemicals being produced.

79-0254. Sahai, R.; Chauhan, M. (Dep. Chem., V.S.S.D. Coll., Kanpur, India) **Pesticidal pollution.** *J. Sci. Ind. Res.* 36(12): 685-694; 1978. (208 references)

In this extensive review article the modes of action of a variety of pesticides are discussed. Compounds are grouped into categories of action on membrane structures, enzyme poisons and biosynthesis reactions. The composition of pesticides in soil is discussed, including many routes of photodecomposition. Adsorption, movement, and distribution of pesticides in soil is also covered. The mechanisms of toxicity and methods of determination of residues by several chemical techniques is described. Also reviewed are mathematical kinetic models by which the persistence of pesticides in the environment may be predicted.

79-0255. Takizawa, Y. (Dep. Public Health, Sch. Med., Akita Univ., Akita, Japan) **Law concerning the examination and registration of manufactures ect., chemical substances and its progressive state of the control chemicals in Japan.** *Mutat. Res.* 54(2): 228-229; 1978.

Lately the assessment of environmental effects caused by chemical substances has become the center of wide interest. The behavior of various chemicals following their discharge into the environment is thought to be affected by multiple factors including transferance among media, i.e. water, atmosphere and soil. When we deal with the effects on human health, the final target is the human body. Some chemicals are carcinogens or mutagens. The chemical production increased by approximately ten times that of 1960. Until 1973, chemicals used in Japan totated 192,263 substances. In view of the importance of health hazards, the chemical control law, "Law Concerning the Examination and Registration of Manufactures, etc., of Chemical Substances" was promulgated in 1973. The existing and new starting chemicals are to be permitted after being checked thoroughly by specialized examiners. Under this law, toxicological testing has been done on only 124 of the above chemicals up to 1975. In the environmental survey a total of 33 chemicals were investigated by the Environment Agency, that is, phthalic acid esters, DDT, HCH (BHC), HCB, PCP, trichloroethylene etc. The investigated samples were taken mainly from river water, fish, birds and other sources. From the experimental data in the past PCB was banned first. Fourteen chemicals stand the test as new productions after careful consideration. OECD is proposing a guide to procedure and requirements for anticipating the effects of chemicals on man and in the environment, and UNEP seems to provide a new field.

79-0256. Hay, A. (Author address not given) **US producers fear ban on 2,4,5-trichlorophenol.** *Nature (London)* 275(5680): 471; 1978.

Concern is expressed over the future of 2,4,5-trichlorophenol (2,4,5-T) since the issuing of a notice or rebuttal against current and continued registration of trichlorophenol and its salts by the EPA. This chemical is widely used in the manufacture of 2,4,5-T, a herbicide, and in the manufacture of the bactericide, hexachlorophene. An extremely hazardous chemical, TCDD is produced during the manufacturing process to the trichlorophenol compounds. TCDD is a

known teratogen and potential carcinogen. The safety of the manufacturing processes is being investigated. Particular attention will be given to the accident at Seveso, Italy nearly two years ago which spilled TCDD into the environment with disastrous results.

79-0257. Bovey, R. W.; Diaz-Colon, J. D. (ARS, USDA, College Station, TX) **Selected bibliography of the phenoxy herbicides. IV. Ecological effects.** *Texas Agric. Exp. Stn. Misc. Publ.* 1360: 1-28; 1978. (196 references)

Presented is a selected bibliography relating to the phenoxy herbicides' use and environmental effects. References are listed in alphabetical order by senior author and indexed by subject (pesticide and organism). In all, 196 citations are included. Papers in languages other than English are accompanied by notations on complete names and origins of the journals, as well as the availability of English abstracts.

79-0258. Olszyna-Marzys, A. E. (Inst. Nutr. Central American & Panama, Guatemala City, Guatemala) **Contaminants in human milk.** *Acta Paediatr. Scand.* 67(5): 571-576; 1978. (13 references)

A discussion of pesticidal contamination of human milk is presented. It is known that because of the high fat content and relatively high acidity of human milk as compared to plasma, nearly all liposoluble and basic agents consumed by the mother will be present in the milk. In the case of DDT, human mothers ecreted 12.5% of their DDT intake, while cows excrete 1.5%; hence, human milk has always been found to contain more DDT than cows' milk. Data collected between 1961 and 1975 show that the average DDT content of human milk (in parts per billion) ranges from approximately 100 in W. Germany to 3540 in Guatemala. The figures indicate that the average Guatemalan baby ingests between 6 and 207 times the amount of DDT considered by the World Health Organization as acceptable.

79-0259. Heitz, J. R.; Wilson, W. W. (Dep. Biochem., Mississippi Agric. & For. Exp. Stn., Mississippi State Univ., Mississippi State, MS 39762) **Photodegradatin of halogenated xanthene dyes.** *Adv. Chem. Ser.* 73: 35-48; 1978. (11 references)

The toxicity of xanthene dyes in insects when exposed to visible light has been established in previous experiments. The toxicity of the dyes seems to be dependent on the phosphorescent characteristics of the compound. The phosphorescent properties of each dye are determined by its chemical structure and so rose bengal dye is more toxic than phloxin B, which in turn is more toxic than eosin yellow. Tests were performed to determine the effects of photodecomposition of xanthene dyes on the dye's toxicity to ordinary house flies and bacterial cultures of *S. aureus* and *B. cereus.* Flies were fed rose bengal that had been exposed to visible light under ordinary environmental conditions for various lengths of time. The longer the dye had been allowed to photodecompose, the lesser was fly mortality. In the bacterial cultures treated with a central disk of filter paper soaked in photodecomposed or undecomposed dye, a definite inhibition of bacterial growth was seen only in the plates where the regular undecomposed bengal rose dye was used. Culture plates containing photodecomposition products of the dye did not effect bacterial growth. It was concluded from these findings that the photodecomposition products of xanthene dyes are not toxic to insects or bacteria in both light-dependent and light independent systems.

79-0260. Fuhremann, T. W.; Lichtenstein, E. P.; Katan, J. (Dep. Entomol., Univ. Wisconsin, Madison, WI 53706) **Binding and release of insecticide residues in soils.** *Adv. Chem. Ser.* 73: 131-140; 1978. (8 references)

This paper summarizes five previous papers by the authors, dealing with soil-bound insecticide residues. The importance of non-persistent pesticides is discussed and data on the time required for the gradual disappearance of various pesticides from soils is presented. Malathion, methyl parathion, and parathion were degraded most rapidly (0.5, 1.5, and 4.25 mo, respectively), while aldrin, carbaryl, guthion, and phorate were considerably more persistent. The levels of major residues from bacterial decomposition were presented for several compounds. The uptake of residues by earthworms and oat plants was also demonstrated. After 2 to 6 wk, earthworms incorporated 2.7% of the methyl parathion applied, and 5.1% was absorbed by oat plants after 2 wk.

79-0261. Romanovskaya, O. I. (Author address not given) **Povedenie gerbitsida pirazona v rasteniyakh i pochve. [Behavior of the herbicide pyrazon in plants and in the soil.]** *Agrokhimiya* (5): 142-151; 1977. (96 references) (Russian)

Data on the mechanism of action, metabolic fate, interaction with other substances in plants and soil, and toxicity of pyrazon are reviewed. Pyrazon was found to have weakly cumulative properties and low toxicity in laboratory animals (LD50 2-3.6 g/kg). No pathological changes were seen in animals fed beets harvested from pyrazon-treated fields. Pyrazon is rapidly detoxified in the soil and plants. No intact pyrazon was found in the leaves of sugar beet plants at harvest; the level of the dephenylated, inactive metabolite was 0.04 mg/kg in the leaves, and 0.3-0.4 mg/kg in the roots of sugar beet plants. Pyrazon is partially degraded by microorganisms in the soil. The benzene ring of the molecule is utilized as a source of carbon by certain gram-negative microorganisms, both at low (4.5°C) and high (29.5°C) temperatures. Depending on the dose and soil type, the phytotoxic effect ceases in 2-12 mo in the soil. Pyrazon migrates only slowly through the soil layers. Only negligible quantities are washed down by precipitation following surface application.

79-0262. Floru, S.; Goga, E.; Tucaliuc, M.; Suta, V.; Isac, M. (Inst. Invest. Plant Prot., Bucharest, Romania) **Reziduuri de pesticide in urma tratementelor in pomicultura in conditii de productie. [Pesticide residues after the application of treatments in commercial orchards.]** *An. Inst. Cercet. Prot. Plant. Acad. Stiinte Agric. Silvice* 12: 425-435; 1977. (Rumanian)

Insecticide residues were determined in various fruits following application of several insecticides at the Voinesti. Maracineni, and Vedea test stations in 1972-1974. Carbetox (malathion) residues declined to undetectable levels within 64 hr after treatment of cherry trees in May. In plums residues declined to less than 0.08 ppm within 15 days or less following treatment with Fosfotox R35 (dimethoate); a similar decline was seen for Fernos 50 (pirmicarb) in 10 days. Various organophosphate pesticides were applied to plums in September 1973; at the time of reexamination, 18 days after application, residues had declined to less than 0.2 ppm for all pesticides tested, including trichlorfon, dichlorvos, parathion, and methyl parathion. However, carbaryl residues were still present at 0.1-0.18 ppm. Kilval (vamidothion) was the only pesticide remaining at more than trace levels. The persistence of carbaryl on pears was substantially greater than that on plums; by 15 days after treatment 0.08 ppm was detectable on plums and 2 ppm on pears. Residues of insecti-

cides and dithiocarbamate fungicides applied in accordance with usual practice were below the established tolerance limits at harvest of plums, pears, and apples except for Ultracid (methidathion) on plums and, in a single case, Kilval (vamidothion) on apples. Thus the currently recommended waiting times between treatment and harvest seem adequate.

79-0263. Narain, N. K.; Melchlor, V. E.; Lewis, C. C.; Irwin, R. D.; Latheef, M. A. (Dep. Chem., Virginia State Coll., Petersburg, VA 23803) **Spectrophotometric estimation of carbaryl residue in some home garden vegetables.** *Anal. Lett.* All(7): 561-567; 1978. (6 references)

Residue levels of carbaryl were studied by spectrophotometry in garden vegetables including cabbage, cucumber, garden bush beans, okra, pepper, squash, and tomato. Carbaryl had been applied during growing of the plants as a 50% wettable powder and sprayed at the rate of 4.0 g AI/l at weekly intervals, using a hand-carried compression sprayer. All plant surfaces were sprayed to run off. Thirteen applications of the insecticide were made in the study plots. The foliage of squash and pepper showed relatively higher values of carbaryl (6.55 ppm and 2.73 ppm) than those of cucumber, okra, and garden bush bean, which showed nil amounts of the residues. Carbaryl residues on the fruits of the vegetables showed none or only trace amounts of the insecticide. Therefore, even with excessive applications, the residues were below the tolerance level established by the EPA.

79-0264. Ward, C. T.; Matsumara, F. (Dep. Entomol., Univ. Wisconsin, Madison, WI 53706) **Fate of 2,3,7,8-tetrachloro dibenzo-*p*-dioxin (TCDD) in a model aquatic environment.** *Arch. Environ. Contam. Toxicol.* 7(3): 349-357; 1978. (10 references)

The fate of TCDD (2,3,7,8-tetrachloro dibenzo-*p*-dioxin) was studied by using aquatic sediment and lake water under laboratory conditions. Most of the TCDD was found in the sediment from which it slowly disappeared. Evaporation may be a major mode of disappearance of TCDD in samples incubated 39 days or more, with metabolism playing only a minor role. Under the experimental conditions the half-life of TCDD was on the order of 600 days. The metabolic activities were enhanced under conditions which stimulated microbial growth in the presence of sediment, and the metabolites were found to be released from the sediment to the ambient water. (Author abstract by permission)

79-0265. Jan, J.; Malnersic, S.; Faganeli, J. (Public Health Inst. Slovenia, Univ. Ljubljana, Ljubljana, Yugoslavia) **Chlorinated hydrocarbons (pesticides and polychlorinated biphenyls - PCBs) in the atmosphere of Ljubljana.** *Arh. Hig. Rada. Toksikol.* 29(1): 15-20; 1978. (16 references)

To determine the levels of chlorinated hydrocarbons (pesticides and PCBs) in the atmosphere of the city of Ljubljana, air samples were collected for 45 days during October and November, 1975. Pesticides, trapped in filters, were extracted with ether:petrolether:benzene (10:20:1) and determination of various compounds was made by gas chromatography. Pesticide residue levels varied from 0.3 ppm for heptachlor, to 35.5 ppm for PCBs. Since only particulate matter was trapped, actual atmospheric levels may have been higher if gaseous forms are also accounted for. Since agricultural areas around the city are few, and very little pesticide usage occurs, the levels of chlorinated hydrocarbons in the air probably come from other regions. Pesticide levels in the atmosphere of Ljubljana are considered of little or no consequence to public health.

79-0266. Wolfe, H. R.; Staiff, D. C.; Armstrong, J. F. (US EPA, Health Effects Res. Lab., Field Studies Sect., Wenatchee, WA.) **Exposure of pesticide formulating plant workers to parathion.** *Bull. Environ. Contam. Toxicol.* 20(3): 340-343; 1978. (10 references)

In order to determine the potential exposure in different work situations in parathion formulating plants, exposure pad studies were carried out on mixers, baggers, mixers-baggers, and stackers-sealers-carton packers. Dermal contamination was measured by absorbant pads attached to the workers' bodies; respiratory exposure was estimated from special filter pads in the subjects' respirators. Mean dermal exposure for all workers (calculated on the basis that workers wore no protective clothing and respirator) was 67.3 $\pm$ 88.8 mg/hr, and the mean respiratory value was 0.62 $\pm$ 0.08 mg/hr. Workers who doubled as mixers-baggers had the highest exposure rates (183.7 $\pm$ 92.7 mg/hr dermal and 0.93 $\pm$ 0.51 mg/hr respiratory). Stackers-sealers-packers had the least exposure to parathion. The mean dermal and respiratory values for all workers indicate that the calculated fraction of a toxic dose received would be 5% per hr of exposure. Most workers in formulating plants are required to wear protective gear, which reduces the potential dermal and respiratory exposure considerably.

79-0267. Sarkka, J.; Hattula, M.; Janatuinen, J.; Paasivirta, J. (Dep. Biol., Univ. Jyvaskyla, Jyvaskyla, Finland) **Chlorinated hydrocarbons and mercury in aquatic vascular plants of Lake Paijanne, Finland.** *Bull. Environ. Contam. Toxicol.* 20(3): 361-368; 1978. (10 references)

Residue levels of chlorinated hydrocarbon pesticides (PCB, DDT, TDE, DDE, aldrin) and mercury in the food webs of Lake Paijanne during 1972-74 were examined. Plant samples from four different sites were collected and analyzed for contamination. Total mercury determination was made by flameless atomic absorption analyses. Concentrations of pesticides were determined by GLC. Average concentrations of mercury were higher than averages of hydrocarbons (54 and 28 μg/kg dry weight, respectively). Of the pesticides, PCB concentrations were highest (20 μg/kg); TDE and dieldrin concentrations did not exceed 0.5 μg/kg. PCB, DDT and mercury concentrations decreased significantly ($p < 0.001$) from 1972 to 1974. Differences between levels of pollutants in different plant species were only significant for PCB; other analyses proved inconclusive. Mercury levels in the water were significant only near the discharge sites, and pesticide levels were small compared with other aquatic systems.

79-0268. Webster, G. R. B.; Sarna, L. P.; Macdonald, S. R. (Pestic. Res. Lab., Dep. Soil Sci., Univ. Manitoba, Winnipeg, Manitoba, Canada) **Nonbiological degradation of the herbicide metribuzin in Manitoba soils.** *Bull. Environ. Contam. Toxicol.* 20(3): 401-408; 1978. (12 references)

The nonbiological degradation of metribuzin (4-amino-6-*t*- butyl-3-methylthio 1,2,4-triazin-5(4H)-one) is influenced by different soil types. In four Manitoba soils (Newdale clay loam, Stockton sandy loam, Almasippi sandy loam, and Red River clay) metribuzin concentrations decreased slowly. At 15°C the rate law describing this degradation was shown to be less than first order. At normal application rates of 1.8 ppm, calculated times for 50% loss varied from 90-115 days in Red River, Almasippi, and Stockton soils, and up to 348 days in Newdale soils. At higher application rates the half lives were shown to be somewhat longer.

79-0269. Ware, G. W.; Cahill, W. P. (Dep. Entomol., Univ. Arizona, Tucson, AZ 85721) **Air concentrations of chlorpyrifos (Dursban) from a 2% slow-release paint-on formulation vs. a standard 0.5% emulsion spray.** *Bull. Environ. Contam. Toxicol.* 20(3): 413-417; 1978. (1 reference)

Comparisons were made of release into the air in a closed room of a 2% slow release paint-on formulation, and a 0.5% emulsion of chlorpyrifos insecticide. For each type of application chlorpyrifos volatilization was measured by sampling the air at 0, 1 and 15 hr after treatment. One hundred ml of 2% paint-on formulation contained 1.74 g chlorpyrifos; 340 ml of 0.5% emulsion contained 1.7 g. One hr after application, 6.10 μg (0.59 ppb) of insecticide was released from the paint-on method; 14 μg (1.26 ppb) were emitted from the spray. The 2:1 ratios of airborne spray:paint were maintained in 15 hr post treatment samples. Both methods emitted chlorpyrifos levels well below the 0.2 mg/m^3 threshold limit value (TLV) set for this pesticide.

79-0270. Ross, R. G.; Wood, F. A.; Stark, R. (Res. Stn., Agric. Canada, Kentville, Nova Scotia B4N 1J5, Canada) **Ethylenebis dithiocarbamate and ethylene thiourea residues in apples and apple products following sprays of mancozeb and metiram.** *Can. J. Plant Sci.* 58(3): 601-604; 1978. (9 references)

In 1975, residues of ethylenebis dithiocarbamate (EBDC) in fresh apples harvested 42 days after receiving the last of nine sprays of the fungicides mancozeb and metiram (a zineb ethylene thiuram disulfide adduct) were 1.70 and 0.50 ppm, respectively. With both fungicides, residues of ethylene thiourea (ETU) were at the analytical sensitivity level of 0.01 ppm. On processing into apple products there was some conversion from EBDC to ETU. Canned apple juice and sauce from mancozeb-sprayed apples both contained 0.05 ppm ETU, while the level in dried apple pomance was 0.17 ppm. Similar levels were present in products prepared from metiram-sprayed apples. In 1976 with both fungicides, the EBDC fresh fruit residues were < 1.0 ppm in apples receiving one, two, three or four cover sprays and ETU was not detected except for a trace in the samples of apples receiving three cover sprays of mancozeb. (Author abstract by permission)

79-0271. Von Stryk, F. G.; Jarvis, W. R. (Res. Stn., Agric. Canada, Harrow, Ont. NOR 1GO, Canada) **Residues of mancozeb, maneb and ethylene thiourea in fungicide-treated field and greenhouse tomatoes.** *Can. J. Plant Sci.* 58(3): 623-628; 1978. (14 references)

Residues of the ethylenebisdithiocarbamate (EBDC) fungicides maneb and mancozeb on tomato fruits ranged between 0.03 and 0.80 ppm (mean 0.31 ppm) when field crops were sprayed five or eight times at intervals of 3-4 days. Ethylenethiourea (ETU) was detected only in one sample, at 0.03 ppm. In canned juice made from whole fruit, EBDC levels ranged from non-detectable to 0.62 ppm (mean 0.31 ppm) and ETU levels from non-detectable to 0.07 ppm (mean 0.02 ppm). These levels were generally higher than in canned peeled fruit where the range of EBDC was from non-detectable to 0.27 ppm (mean 0.09 ppm) and of ETU from non-detectable to 0.05 ppm (mean 0.01 ppm). On greenhouse tomatoes, two or four sprays with mancozeb resulted in residues of up to 2.81 ppm EBDC (mean 0.714 ppm) and 0.08 ppm ETU (mean 0.0097 ppm) on the fruit. All levels of EBDC were below the Canadian tolerance level of 4 ppm but ETU is unacceptable in food in Canada. (Author abstract by permission)

79-0272. Ochomogo, O. R. (Louisiana State Univ., Baton Rouge, LA 70803) **Degradation of azinphosmethyl (Guthion) in sugarcane juice, sirup.** *Diss. Abstr. Int. B.* 39(3): 1193; 1978.

The organophosphorus insecticide azinphosmethyl, sold commercially as Guthion, has been used in Louisiana for several years to control the sugarcane borer, *Diatraea saccharalis* (F.), which is the major economic pest of this crop. This investigation was designed to develop an accurate, rapid and reliable method for the quanlitative and quantitative analysis of azinphosmethyl, and to use this analytical procedure to measure the degradation and distribution of this insecticide in the products obtained during the processing of sugarcane. To accomplish these objectives, a surface extraction technique with benzene was developed to extract the pesticide from samples for first juice, clarified juice, sirup, molasses, raw residues. Gas chromatography was used to compare the accuracy and effectiveness of detection. The method developed for extraction of the insecticide was approximately 90-92% effective in the recovery of the insecticide from samples of raw and refined sugar that had been fortified with 2 ppm of azinphosmethyl. Samples were collected during 1977 from the Cinclare sugar mill at Brusly, Louisiana, so that studies in the distribution and thermal degradation of the insecticide could be performed during the sugarcane processing. Four replicate samples of first juice, clarified juice, sirup, molasses and raw sugar were collected once a week for five weeks, extracted, and analyzed for residues. Although analytical results showed residues of azinphosmethyl ranging from 0 to 0.50 ppb in the first juice, the

pesticide was significantly degraded as the process continued. It was apparent that the high temperatures used in the clarification and concentration of the juice significantly destroyed the pesticide residue. Analysis of variance for the data obtained in the randomized block design indicated significant differences in azinphosmethyl residues between the various steps of the sugarcane processing. When orthogonal comparisons were made, the results of the analysis indicated a highly significant reduction of azinphosmethyl (probability < 0.01) from the first juice toward the end of the process. Traces of residues were found in molasses samples, but no residue was detected in raw sugar collected during the 1977 season. Refined sugar obtained from a local supermarket did not contain any residue of azinphosmethyl. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 7815634)

79-0273. Kobayashi, S.; Lee, G. F.* (Environ. Sci., Univ. Texas Dallas, Richardson, TX 75080) **Accumulation of arsenic in sediments of lakes treated with sodium arsenite.** *Environ. Sci. Technol.* 12(10): 1195-1200; 1978. (22 references)

Sodium-arsenite, an aquatic herbicide, has been extensively used in Wisconsin lakes for the control of excessive macrophyte growths. Sediments in several of these treated lakes were investigated for patterns of arsenic accumulation with depth and relationships to iron, manganese, calcium, and organic carbon content. All sediments had substantial accumulations of arsenic, but no predominant correlation was found with other measured components. In these surficial sediments, arsenic appears to be in a nonoccluded form with highly organic sediments being more readily leached of arsenic than highly calcareous sediments. (Author abstract reprinted by permission of the American Chemical Society)

79-0274. Fanelli, R.; Chiabrando, C.; Salmona, M.; Garattini, S.; Caldera, P. G. (Mario Negri Inst. Pharmacol. Res., I-20157 Milan, Italy) **Degradation of 2,3,7,8-tetrachloro dibenzo- *p*-dioxin in organic solvents by gamma ray irradiation.** *Experientia* 34(9): 1126-1127; 1978. (23 references)

The effect of gamma rays on TCDD dissolved in organic solvents was investigated as a possible aid in the decontamination procedures being used in Seveso, Italy, where an explosion in a manufacturing plant sprayed a large area with TCDD. An experimental irradiator containing a 10,000-Ci ^{60}Co source was used for the irradiations in this study. The dose rate was one million rad/hr. TCDD disappeared in a direct relation to the total dose of radiation absorbed. The type of solvent used was also important for the efficiency of the degradation process. In analyzing the irradiated solutions for the presence of toxic substances other than TCDD, trichloro- and dichlorodibenzo- *p*-dioxins were present in all solutions, suggesting that the degradation process occurs at least partly with the loss of chlorine atoms from the TCDD molecule.

79-0275. Zell, M.; Nev, H. J.; Ballschmiter, K. (Abt. Anal. Chem., Univ. Ulm, D-7900 Ulm, BRD) **Single component analysis of polychlorinated biphenyl (PCB)- and chlorinated pesticide residues in marine fish samples.** *Fresenius Z. Anal. Chem.* 292(2): 97-107; 1978. (26 references)

Besides 83 structurally defined trichloro- to octachloro- biphenyls (PCB), the following chlorinated pesticides have been identified in fish liver oil (DAB 6) and fish liver extracts: HCB; α-HCH (BHC); γ-HCH (lindane); 2,4′-DDE; 4,4′-DDT; 4,4′-DDT; 2,4′-DDD (TDE); 4,4′-DDD; dieldrin; and endrin. By analyzing constant relative amounts of PCB-components present only in defined technical PCB-mixtures, the original PCB-pattern in environmental samples could be calculated. A mixture of Clophen A 60: Clophen A 50 or of Aroclor 1260: Aroclor 1254 of 2.2:1 gives the best fit. The constant ratio of four octachloro- biphenyls in technical mixtures and environmental samples as well requires the assumption of complete environmental stability of these compounds in spite of any thinkable differences in environmental pathways. This assumption of environmental persistency is supported by a degree of degradation up to 80% of the calculated input observed for some higher chlorinated PCB-components, e.g. 2,2′,3,4,5′,6- hexachloro- biphenyl. Correlating the amount of each identified PCB-component to the octachloro- biphenyl as the internal standard, a correlation of the degradation with the PCB-substitution pattern is possible. Persistency is observed, if vicinal hydrogens are missing or a 4-position is chlorinated. A 4,4′-disubstitution favors persistency most. (Author abstract by permission)

79-0276. Oden, S.; Ekstedt, J. (Avd. Ekokem., Inst. Markvetenskap, S-75007 Uppsala, Sweden) **Areala och temporala forhallanden rorande DDT i skandinaviska jordar. [Areal and time-related relations concerning DDT in Scandinavian soils.]** *Grundfoerbaettring* 27(2-3): 63-70; 1976. (9 references) (Swedish)

The evolution of the residue levels of DDT and its metabolites in soils in different parts of Scandinavia during the 1966-1975 period is described. The total DDT level has dropped substantially from 100-10,000 ng/g in 1966 to < 1-100 ng/g in 1975. The half-life was found to be less than 1 yr. DDD (TDE) occurs only occasionally, indicating the absence of anaerobic biodegradation; it accounted for only 4% of the total DDT in 1974. DDE accounts for up to 10% of the total DDT, but the DDE: total DDT ratio increased slightly from 0.10 to 0.15 during the 1966-1975 period, and ratio of 0.15-0.25 were found along the east and west coasts of Scandinavia, which indicates the transfer from water surface (DDE-enriched films) to the nearby soils through the atmosphere.

79-0277. Pandey, S. Y.; Jain, H. K.; Agnihotri, N. P.; Dewan, R. S. (Div. Agric. Chem., Indian Agric. Res. Inst., New Delhi 110012, India) **Persistence of disulfoton in soil and its residues in mung (*Phaseolus aureus*) and cow pea (*Vigna sinensis*).** *Indian J. Agric. Chem.* 9(1-2): 61-66; 1976. (6 references)

Persistence and degradation of disulfoton in mung and cow pea were studied after granules of the chemical had

been applied in furrows at the rate of 1.5 kg AI/ha. Each crop was treated three times. Plant samples were taken on 15, 25, 35, 50, 65, and 100 days after treatment. The disulfoton residues were seen to dissipate progressively from 11.5% during the first 10 days to 91.5% at the end of the 65 day period. No detectable residues of disulfton were found in the top 15 cm of soil at time of harvest. Disulfoton dissipated more rapidly from day 10 onward. Disulfoton dissipated three times faster in mung plots than in soil from cow pea plots. Degradation in both plots followed a first order reaction. The translocation of disulfton was followed in the various plant parts. Beyond the 35th day, such translocation ceased. No discernible residues of disulfoton or any of its metabolites were found in any of the plant parts at harvest.

79-0278. Krishnaiah, K.; Prasad, V. G. (Indian Inst. Hortic. Res., Bangalore 560006, India) **Note on the persistence of monocrotophos residues in okra.** *Indian J. Agric. Sci.* 48(1): 56-58; 1978. (8 references)

The dissipation of monocrotophos residues was studied after the chemical had been sprayed on a crop of okra during the fruiting period at a rate of 0.5 kg AI/ha. Medium and normal marketable sized fruits were harvested at 0, 1, 4, 7, and 10 days after spraying. Deposits on okra fruits were 0.23, 0.21, and 0.19 ppm on 0, 1, and 4 days after spraying. No detectable residue was present on days 7 or 10. Washing the fruits 0.5 hr, 1 day, and 3 days after spraying removed 0.28, 0.19, and 0.05 ppm residues, respectively. Washed samples of 0 and 1 day contained less than 0.2 ppm residues. A decrease was noted in the extent of removal of residues with washing with the time lapse after spraying.

79-0279. Kavadia, V. S.; Noor, A.; Kathpal, T. S. (Rajasthan Coll. Agric., Udaipur 313001, India) **Movement and residues of endosulfan in maize plants.** *Indian J. Agric. Sci.* 48(43): 176-178; 1978. (12 references)

Maize was treated three times with 0.1% spray (2 kg AI/ha) or twice with 4% granules (1.75 kg AI/ha) of endosuofan. The spray application dissipated faster than did the granular formulation. Cumulative residues of endosulfan just after the second and third sprayings were 34.20 and 31.44 ppm. The residue on husk increased to 1.55 ppm after 48 days from 0.98 ppm just after spraying, indicating a slight accumulation of the insecticide in the husk. After granular treatment the insecticide detected 43 and 63 days after treatment was 1.00 and 1.42 ppm in the husk, which corresponded to 2.42 and 3.44% of the cumulative residue after the second application. This finding makes it clear that endosulfan moved from treated parts of the plants to untreated ones. Cumulative deposits of about 30 to 41 ppm were found on the crops from the spray and granular formulations. Harvest residues 63 days after granular application were 1.70 ppm, which is below the tolerance level of 2 ppm.

79-0280. Dhaliwal, G. S.; Kalra, R. L. (Dep. Entomol., Punjab Agric. Univ., Ludhiana, India) **DDT residue in milk samples from Ludhiana and surrounding areas.** *Indian J. Ecol.* 4(1): 13-22; 1977. (17 references)

Milk samples were collected from rural areas, sale depots of the Punjab Dairy Development Corporation, the milk supply of the Punjab Agricultural University, local dairies in Ludhiana City, and direct milk suppliers. All samples contained detectable amounts of DDT residues. TDE was the most prominant metabolite. Out of 23 samples of milk from rural areas, 21 (91%) contained residues of DDT higher than the tolerance level. DDT residues (total) ranged between 0.019 and 1.09 ppm. Samples from Ludhiana city contained lower DDT levels, with only 3 samples containing DDT levels above the tolerance limits. The range of residues varied from 0.02 to 0.28 ppm. It is suggested that the intake of the DDT found in the contaminated samples occurs on farms where cattle are fed diets containing DDT from spraying. However, the farmers surveyed indicated that no DDT spraying had been done for plant protectin work in the rural areas from where the milk samples were collected. The only use of DDT had been in August of 1976 for control of malaria where the walls and roofs of homes were sprayed at doses of 1 g/m^3. It is suggested that the heavy concentration of DDT on the walls of houses might be contaminating the cattle feed. When examined, the highest concentration of DDT residues in wheat straw sampled from rural houses was 0.5 ppm.

79-0281. El Beit, I. O. D.; Wheelock, J. V.; Cotton, D. E. (Sch. Biol. Sci. Univ. Bradford, West Yorkshire BD7 1DP, England.) **Factors affecting the fate of dimethoate in soils.** *Int. J. Environ. Stud.* 11(2): 113-124; 1977. (23 references)

The leachability of dimethoate and the factors affecting this process were studied in several types of soil. The total amount of dimethoate removal through leaching increased progressively with successive leachings and then remained constant in all the soils tested. The proportion of pesticide leached was affected by soil type and increased as follows: clay, clay loam, loam, soil clay loam, and sand, with sand showing the greatest effect. The leaching of dimethoate was also affected by the amount of the pesticide applied. A near linear relationship existed between the quantity of dimethoate leached and the amount applied to the soil. The amount of dimethoate retained in the soil was also investigated. Loam had the highest retention capability and sand the lowest. Only a proportion of the pesticide applied to the soil can be accounted for in terms of leaching or retention. The amount not recovered by leaching or retention was greatest in clay and clay loam. An increase in the amount of pesticide retained was noted with progressively increased concentrations of pesticide applied. For all soils the percentage of dimethoate leached and retained in the covered samples of soil was greater than in uncovered ones. The total amount retained was proportional to the depth of the soil and thus, to the amount of soil present. Evaporation was greatest in sand. Dimethoate loss was greater in sterile than in non-sterile soils.

79-0282. El Beit, I. O. D.; Wheelock, J. V.; Cotton, D. E. (Sch. Biol. Sci., Univ. Bradford, West Yorkshire BD7 1DP,

England) **Factors affecting the accumulation of dimethoate in soil.** *Int. J. Environ. Stud.* 11(3): 187-196; 1977. (6 references)

Dimethoate accumulation in soil was studied under various conditions of soil moisture content, rate of water application, soil organic matter content, and the frequency of application of dimethoate. When the frequency of application of dimethoate was increased, the residual accumulation of the pesticide was also increased; this was also observed to be the case under leaching conditions. An increased loss by leaching was noted under conditions where the initial soil moisture content was increased. This resulted in a decreased in the amount of chemical retained in the soil. The loss of pesticide from the soil was also increased with amount retained. Loss by leaching, evaporation or co-distillation was increased when organic matter was removed from the soil. However, the lack of organic matter from the soil reduced biological degradation of the pesticide. In order to reduce the hazards of dimethoate residues in soil, frequent, light irrigation rather than heavy flooding of the field, would appear to be appropriate after the pesticide is applied.

79-0283. El Beit, I. O. D.; Wheelock, J. V.; Cotton, D. E. (Sch. Biol. Sci., Univ. Bradford, West Yorkshire BD7 1DP, England) **Factors influencing the degradation of dimethoate in soils and solutions.** *Int. J. Environ. Stud.* 11(4): 253-260; 1978. (7 references)

The degradation of dimethoate was studied in soil and in solution under varying conditions of temperature, time pH, and open vs closed distilled water systems. High temperature and alkaline conditions favored rapid degradation of dimethoate. The persistence of the pesticide is favored by low temperatures and acidic conditions. The loss of dimethoate by evaporation and degradation is increased under conditions of high temperatures. Degradation in solutions of lime, urea or in distilled water was highly correlated with temperature. Degradation in soil samples treated with lime, urea or distilled water was only moderately correlated with the temperature. The results of the study suggest that smaller amounts of dimethoate should be applied to a soil which has been treated with urea, in order that residual accumulation will be minimized.

79-0284. Maybank, J.; Yoshida, K.; Grover, R. (Sask. Res. Counc., Saskatoon, Sask., Canada) **Spray drift from agricultural pesticide applications.** *J. Air Pollut. Control Assoc.* 28(10): 1009-1014; 1978. (8 references)

The extent of airborne pesticide drift from ground and aerial application was determined in areas of the Canadian prairies. Drift was related to meteorological conditions, formulations of pesticide, and sprayer type. Thirty to forty percent of the butyl ester of 2,4-D and 10-15% octyl ester deposited evaporates and drifts within two hrs after spraying. Conclusions are that spraying should be done under low wind conditions, using low pressure sprayers, and thickeners to allow for more total solution volume. Although these studies were carried out on 2,4-D, the results could be applied to the application of any herbicide.

79-0285. Robinson, E.; Fox, L. L. (Washington State Univ., Pullman, WA) **2,4-D herbicides in central Washington.** *J. Air Pollut. Control Assoc.* 28(10): 1015-1020; 1978. (11 references)

Due to the hazards of drifting 2,4-D to the grape industry of central Washington, a monitoring program was established. Correlations were made between atmospheric conditions, vineyard damage, and weather patterns. Continuous sampling of air was carried out at a series of eight sampling stations along the Yakima River Valley. Levels of 2,4-D were determined by gas chromatography. High volatile type compounds (esters with 5 or less carbon atoms) accounted for most of the 2,4-D sampled, with an average concentration of 0.23 mg/m^3 as opposed to 0.06 and 0.01 mg/m^3 of low volatile and non-volatile compounds, respectively. It was determined that 2,4-D drifts from 16.09 - 80.45 Km from aerial spray sources.

79-0286. Steele, L. A.; Nelson, H. A.; Furr, A. A.; Osheim, D. L.; Ross, P. F.; Lund, S. A. (Author address not given) **Toxaphene residues in cattle after oral exposure.** *J. Am. Vet. Med. Assoc.* 173(7): 878; 1978.

Toxaphene is a chlorinated hydrocarbon insecticide widely used in the United States and specifically approved by the US Department of Agriculture, Animal and Plant Health Inspection Service for the treatment of cattle scabies. There is presently a lack of information concerning tissue levels of toxaphene in cases of oral exposure. Such data is needed to support field diagnoses of toxaphene poisoning. In this study, toxaphene was orally administered to mixed-breed beef calves at levels of 50, 100, and 150 mg/kg. Liver, kidney, and brain samples were collected and analyzed for toxaphene residues by gas liquid chromatography procedures. Toxaphene levels were also determined in tissues collected from field cases of suspected toxaphene poisoning. (Author abstract by permission)

79-0287. Leshchev, V. V.; Frolov, B. A. (All-Union Sci. Res. Inst. Vet. Hyg., USSR) **Ostatki vinilfosfata v organizme kur. [Vinyl phosphate residues in hens.]** *Khim. Sel'sk. Khoz.* 16(6): 71-72; 1978. (3 references) (Russian)

Vinyl phosphate residues were determined in different organs of hens by gas-liquid chromatography 1-14 days after the birds were sprayed with a 0.1% aqueous emulsion of this preparation at a rate of 50 ml/bird. Vinyl phosphate was determined in the form of its *trans* isomer. The vinyl phosphate residue level found in the heart, lungs, liver, spleen, muscles and ovaries ranged from 0.05-0.33 mg/kg on the first day, with the highest level in the liver and the lowest in the muscles. Residues were found in the kidney on the third day only. Ten days after spraying, residues were found only in the heart (0.18 mg/kg) and muscles (0.05 mg/kg). No residues at all were found 14 days after treatment.

79-0288. Gavrichenko, A. I. (All-Union Sci. Res. Inst. Occup. Safety Agric., Orel, USSR) **Soderzhanie pestitsidov v**

vozdukhe teplits. [Pesticide levels in the air of hothouses.] *Khim. Sel'sk. Khoz.* (7): 56-58; 1978. (Russian)

The evolution of the kelthane (dicofol) concentration in the air of a 1,000 m^2 hothouse was studied after the spraying of cucumber plants with a 0.2% solution. The air samples were taken hourly at 1.2 and 1.7 m above floor level. The kelthane concentration in the air was found to rise during the first 8 hr after spraying, reaching a maximum at 22 mg/m^2, after which it dropped to the MAC level of 0.1 mg/m^3 in 15 hr, i.e., the concentration exceeded the MAC value for 23 hr. The reduction in the concentration was basically due to air exchange during infiltration, rather than to decomposition of kelthane. Similar findings were also obtained in other experiments with acrex (dinobuton), karathane (dinocap), and other pesticides in other hothouses.

79-0289. Babkina, E. I.; Siverina, A. A. (Inst. Exp. Meteorol., Obninsk, USSR) **Opredelenie polikhlorpinena v pochve. [Determination of polychloropinene in soil.]** *Khim. Sel'sk. Khoz.* (7): 72-74; 1978. (7 references) (Russian)

The determination of polychloropinene in soil is described. Following extraction with 1:4 mixture of acetone-hexane or hexane-petroleum ether, polychloropinene was determined on a gas chromatograph with electron capture detector, using a column filled with Chromatone N-AW-DMCS with 5% SE-30, following dehydrochlorination with alcoholic alkali solution. The identification and quantitative determination were done from the sum of the three peaks by comparison with a standard solution. The sensitivity of the method amounts to 0.5 ng in the range of 0.5-5.5 ng, or 30 μg/kg. PCBs, DDT and its metabolites do not interfere with the determination.

79-0290. Giam, C. S.; Chan, H. S.; Neff, G. S. (Dep. Chem., Texas A & M Univ., Coll. Station, TX 77843) **Phthalate ester plasticizers, DDT, DDE and polychlorinated biphenyls in biota from the Gulf of Mexico.** *Mar. Pollut. Bull.* 9(9): 249-251; 1978. (11 references)

Samples of biota were collected from the Gulf of Mexico and then subjected to analytical procedures to determine concentrations of phthalate ester plasticizers, DDT, DDE and PCB present in them. Di-(2-ethylhexyl)phthalate (DEMP) was detected in the majority of the samples. Dibutyl phthalate was found in water and sediment samples from the Gulf but was not above the 0.1 ng/g detection limit concentration. All samples contained DDT and PCB. Levels of DEHP were significantly lower than those of the PCB. The fact that only low levels of phthalates were present in the biota is due perhaps to their relatively rapid metabolism. The two samples which were collected the furthest away from the shore had relatively high levels of DDT and PCB which may be due to the nature and age of the samples themselves. DDT and PCB levels appear to be decreasing relative to those found in the 1971 survey. For the 1971 study the residue levels for PCB and DDT were 60 ng/g and 50 ng/g, respectively, compared to 26 and 10 ng/g in the more recent study.

79-0291. Daelemans, A.; Siebering, H. (Assoc. Euratom-ITAL, Wageningen, The Netherlands.) **Distribution of methyl bromide over the phases in soil.** *Meded. Fac. Landbouwwet. Rijksuniv. Gent.* 42(2): 1729-1738; 1977. (15 references)

The distribution of methyl bromide over the solid, liquid, and gas phases of the soil was studied. The soil samples studied (a loam, a loamy sand, and a peaty clay) were moistened to different levels and placed in 42.3 cm^3 flasks, and the values for the three phases were determined as follows: $Vg=42.3 - (V_l + Vom + Vmp)$ where the volume of the liquid (V_l), the volume of the organic matter (Vom), and the volume of the mineral parts (Vmp) were calculated from weight and density of the different parts. The concentration in the liquid phase can be inferred from the concentration in the gas phase, the volume of gas, and K^1/g; and the amount adsorbed by the soil is found by subtracting the amounts in the water and gas phases from the amount added. A linear relationship was discovered between adsorption and the organic matter content of the soil.

79-0292. Takase, I.; Nakahara, T.; Ishizuka, K. (Inst. Appl. Biochem., Univ. Tsukuba, Sakura, Ibaraki 300-31, Japan) **Degradation of 3-(3-chloro- 4-chlorodifluoro methylthio phenyl)- 1,1-dimethylurea (Clearcide) in paddy soils.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 3(1): 9-19; 1978. (22 references)

Clearcide (thiochlormethyl) was carbon-14 labeled at the 1,1-dimethyl moiety and applied to paddy soils under flooded conditions. When the growth periods were completed for the rice plants, soil samples were taken and extracted with 80% acetonitrile and partitioned into organic, aqueous and unextracted fractions. The chloroform soluble fraction contained more than 50% of the radioactivity, even after a lapse of time. The activity found in the water soluble portion was negligible. The acetonitrile extracts contained mainly parent Clearcide with small amounts of degradation products. The major degradation products were desmethyl Clearcide and Clearcide sulfoxide and its sulfone, along with desmethyl Clearcide sulfoxide, its sulfone and aniline derivatives, which were present in lesser amounts. The half life of Clearcide in the paddy soil was about 30 to 40 days.

79-0293. Kaneko, H.; Ohkawa, H.; Miyamoto, J. (Pestic. Div., Res. Dep., Sumitomo Chem. Co. Ltd., Takarazuka, Hyogo 665, Japan) **Degradation and movement of permethrin isomers in soil.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 3(1): 43-51; 1978. (9 references)

Permethrin isomers were degraded in two types of soil under upland conditions. Both *trans*- and *cis*-isomers of permethrin were applied at the rate of 1.0 ppm. Rapid degradation took place with the half-lives being approximately 6 to 12 days. The time required for the disappearance of 90% of the applied insecticide was 30 to 50 days for *trans*-permethrin and 40 to 60 days for *cis*-permethrin. Both isomers underwent hydroxylation as the main pathway of degradation, both at the phenoxy group of the alcohol moiety and at the

gem-dimethyl group of the acid moiety. They also underwent cleavage of the ester linkage, and oxidation of benzyl alcohol to benzoic acid. When applied in the field, permethrin is likely to stay mainly at the application sites, and not to move to the other parts of plants and soils. The chemical appears to be easily degraded in soils and plants as well as by sunlight. Thus the chemical is considered to be neither persistent nor dispersive in the environment.

79-0294. Leoni, V.; d'Allessandro De Luca, E.; Biocca, M. (Ist. Igiene "G. Sanarelli," Univ. Roma, Rome, Italy) **Aggiornamento di dati sulla presenza dei pesticidi clororganici nei tessuti adiposi umani. [Update on the levels of organochlorine pesticides in human fatty tissues.]** *Nuovi Ann. Ig Microbiol.* 28(1): 15-24; 1978. (41 references) (Italian)

Organochlorine pesticide levels determined in 28 biopsied human adipsoe tissue samples from residents of Rome and the Lazio in 1973-74 were markedly lower than their repsective levels found in 1966. Total equivalent DDT (DDE and DDT isomers) was 9.724 ppm, dieldrin 0.351 ppm, heptachlor epoxide 0.189 ppm, hexachlorobenzene 1.022 ppm, total BHC 1.075 ppm and γ- BHC (lindane) 0.074 ppm. The drop is attributed to the restrictions placed in Italy on the use of the above pesticides in recent years.

79-0295. Triplett, G. B., Jr.; Conner, B. J.; Edwards, W. M. (Dep. Agron., Ohio Agric. Res. & Dev. Cent., Wooster, Ohio) **Herbicide runoff from conventional and no-tillage cornfields.** *Ohio Rep.* 63(5): 70-73; 1978.

The movement of atrazine and simazine from both no-tillage and conventionally tilled cornfields under rainfall conditions was studied using small instrumented watersheds. Soil fertility practices were adequate for satisfactory growth of the crop under both conventional and no-tillage systems, with typical fertilizer applications being 76.9 kg/acre of nitrogen broadcase plus 9.1-16.38-30.94 kg/acre of NPK, respectively. These chemicals were applied with the plants. Herbicides were applied to 11 different watersheds over a 3 yr period. Most transport of the herbicides occurred in the first one or two runoff events after application. The average transport for all watersheds was 1.1% of the applied atrazine, and 1.4% of the applied simazine. Maximum transport of the atrazine and simazine for any one watershed-year was 26.64 mg/acre and 53.28 ml/acre respectively or 5.7 and 5.4%, respectively. The pattern of greater herbicide transport from the first runoff event being less in subsequent events had also been found in previous studies of similar problems. Simazine appeared in the runoff for a longer period, or at higher concentrations for a given period after application than did atrazine, except at low soil moisture index values. Concentration of atrazine in runoff water was not influenced by the method of tillage. However, a significantly greater amount of simazine was found in runoff from tilled fields than from no-till fields. Based on the findings of this study, atrazine and simazine applied to row crops should not pose a serious environmental hazard. For crops planted over a large area, planting and spraying operations would be spread over several wk. Significant rainfall would perhaps cause significant herbicide movement only in areas most recently treated.

79-0296. Rajukkannu, K.; Raguraj, R.; Krishnamurthy, K. K.; Subramaniam, T. R. (Tamil Nadu Agric. Univ., Coimbatore 641103, India) **Persistence of phorate and carbofuran in flooded soils.** *Pesticides* 11(1): 14-15; 1977. (4 references)

Phorate 10% and carbofuran 3% granules were applied to rice soil at the rate of 1.25 kg AI/ha in two split doses. Fifteen days after transplanting the first dose was applied, with the second being applied 30 days after the first application. Immediately after collection of soil samples at 1, 3, 5, 10, 20, and 30 days after application, phorate and carbofuran concentrations were determined. Phorate concentration declined from 3.02 ppm immediately after application to 0.3 ppm within 20 days. After the second application on day 30, 3.46 ppm of the chemical was detected 1 day after application which decreased to 0.15 ppm by day 50, indicating fast degradation. After harvesting the crop, it was determined that concentrations of 0.083 ppm phorate were present in the hulled grain; this is above the EPA tolerance limit, which is zero for phorate. After the first application of carbofuran, the concentration detected was 8.26ppm which decreased slowly over a period of time, to 1.55 ppm to 2.12 ppm at day 30. Carbofuran residues in the grain and straw samples were well below EPA tolerance levels.

79-0297. Warnes, D. D.; Andersen, R. N.; Stucker, R. E. (Minnesota Agric. Exp. Stn., St. Paul, MN) **Dissipation of metribuzin as affected by soil pH and tillage.** *Proc. North Cent. Weed Control Conf.* 32: 43-47; 1977. (4 references)

Sixty-five plots of soil which were graded from a Hammerly clay loam to a McIntosh silt loam, to a Winger silty clay loam were treated with metribuzin at 0, 0.455, 0.683, 0.910, and 1.138 kg/acre. The soil had a pH ranging from 7 to 8. Soybeans were planted three days after spraying. Soybeans were injured and yield decreased by each level of treatment. As the soil pH increased, injury and yield reductions also increased. In the fall, the area was disced and half of each plot was plowed with a moldboard plow. In May of the following year, several days before planting, the seedbed was prepared with a field cultivator and a spike-toothed harrow. Soybeans, oats, and sugarbeets were planted to assay metribuzin persistence. Sugarbeets were more subject to injury from the metribuzin remaining than were soybeans or oats. As the soil pH increased, so did sugarbeet injury. In the fall, the entire area was plowed with a moldboard plow and was planted with sugarbeets the following spring. After this planting, no injury to sugarbeets was seen from any metribuzin treatment which had been applied two years previously.

79-0298. Moye, H. A.; McCornack, A. A. (Pestic. Res. Lab., Food Sci. & Hum. Nutr. Dep., Univ. Florida, Gainesville, FL 32611) **Residues of 2,4-dichloro phenoxyacetic acid herbicide (2,4-D) in valencia oranges following post-harvest dip.** *Proc. Florida State Hortic. Soc.* 90: 13-14; 1977. (3 references)

A quantity of valencia oranges were treated for 0.5 min. in a dip containing 2,4-D alkanolamine salt at concentrations of 0, 500, and 1000 ppm. When the oranges were tested without storage, the edible portion exhibited a maximum of 0.17 ppm while the peel of this sample contained a residue concentration of 6.8 ppm. After storage at 4.4°C a steady decline was noted. The pulp which had been treated with 500 ppm after 8 wk showed a residue concentration of 0.015. At the treatment level of 1000 ppm, the 8 wk storage residue concentration for pulp was 0.041 and for peel the concentration was 4.4 ppm. After a 10 wk storage period, pulp of oranges treated with 500 ppm showed a residue concentration of 0.10 ppm, while the peek showed a 1.1 ppm residue concentration. A treatment level of 1000 ppm showed a residues after 10 wk storage of 0.044, and 4.1 ppm in the pulp and peel, respectively.

79-0299. Nigg, H. N.; Thompson, N. P.; Allen, J. C.; Brooks, R. F. (Agric. Res. & Educ. Cent., Inst. Food & Agric. Sci., Univ. Florida, Lake Alfred, FL 33850) **Worker reentry and residues of ethion, parathion, and carbophenothion (trithion) on Florida citrus.** *Proc. Florida State Horitc. Soc.* 90: 19-21; 1977. (12 references)

The effects of weather conditions on the degradation of ethion, parathion, and carbophenothion and their oxon metabolites were studied on Valencia leaves in Florida citrus groves. All residues disappeared more quickly under conditions of increased temperature and moisture. Correlations of the residue data with temperature, rainfall, and leaf wetness were significant at the 5% level or better. Under conditions which were hot and wet, a specific degree of residue decay took place in 14 days, which took a total of 35 days to occur under dry and cool conditions. Under Florida weather conditions, the organophosphate insecticides hydrolyze rapidly into non-toxic products, thus lowering the potential for a worker reentry illness as compared to weather conditions in California where slower degradation conditions might enhance the possibilities for worker illness upon reentering pesticide-treated fields.

79-0300. Moye, H. A.; Barmore, C. (Prestic. Res. Lab., Food Sci. & Hum. Nut. Dep., Univ. Florida, Gainesville, FL 32611) **Residues of 2,4-dichlorophenoxy acetic acid herbicide in persian limes and their processed products following preharvest spraying.** *Proc. Florida State Hortic. Soc.* 90: 266-267; 1977. (4 references)

Groupings of trees in a Persian lime grove in good horticultural condition in Florida were sprayed with either a 25 or a 50 ppm solution of 2,4-D. Each tree was treated with approximately 18.95 L of solution until runoff occurred. Fruit was harvested at random intervals for each treatment at day 0, 14, 21, or 42. Residues were found only in the peel samples, and at maximum levels of only 0.35 ppm, therefore the 25 and 50 ppm preharvest spray cannot be considered a practice which is detrimental to the consumer health. There is an existing residue tolerance of 5 ppm for 2,4-D based on fresh weight of whole fruit.

79-0301. Thompson, N. P.; Witkonton, S.; Baranowski, R. M. (Pestic. Res. Lab., Food Sci. & Hum. Nutr. Dept., Univ. Florida, Gainesville, FL 32611) **Ethion, malathion and supracide residues on mangos.** *Proc. Florida State Hortic. Soc.* 90: 270-271; 1977. (1 reference)

Mango trees were sprayed with various insecticides and an oil carrier. The treatments included ethion, 4E at 0.1776 l active ingredient per 378.52 l, ethion, 4E at 0.5552 l active ingredient, supracide, 2E at 0.1184 l, Supracide (methidathion), 2E at 0.2368 l, Malathion at 0.4736 l, and malathion at 0.9472l active ingredient per 378.52 l. All of the insecticides tested were effective in control of oleander scale in the mango tree with supracide giving the best control. At the 0.1776 l concentration, ethion residues were present in concentrations of 4.20, 3.75, 3.43, and 2.91 ppm in the peel at 7, 14, 21, and 28 days after spraying, respectively. Similar data for ethion monoxone at similar concentrations of application were 0.07, 0.08, 0.10, and 0.15 ppm. For the whole fruit, the values were 1.06, 1.16, 1.03, and 0.34, ppm, respectively, for ethion. The values for ethion monoxone in the whole fruit were 0.02, 0.04, 0.03, and 0.02 ppm, respectively. Malathion applied at the 0.4736 l concentration gave rise to peel residues of 0.015, 0.012 ppm, and trace only at 7, 14, and 21 days after application. Residues in the whole mango were trace amounts only for each of the testing times after application of malathion at this concentration. When malathion was applied at twice the amount (0.9472 l), a residue of 0.017 ppm was found in the whole mango at 7 days after application.

79-0302. Liberti, A.; Brocco, D.; Allegrini, I.; Cecinato, A.; Possanzini, M. (Lab. Inq. Atmos. CNR., I-00131 Rome, Italy.) **Solar and UV photodecomposition of 2,3,7,8-tetrachloro dibenzo-*p*-dioxin in the environment.** *Sci. Total Environ.* 10(2): 97-104; 1978. (4 references)

Field experiments were conducted near Seveso, Italy to evaluate the usefulness of ultraviolet sources indoors and outdoors for decomtanimating the houses polluted by TCDD. The effect of UV treatment on soil decomposition was also studied. Findings suggest that photodecomposition of TCDD by ultraviolet radiation or by solar radiation can be used to decomtaminate objects polluted by this substance only after a hydrogen donor solution has been sprayed on the contaminated objects. UV radiation is effective only on the surface. However, some decomposition was noted beneath the surface. It is urged that photodecomposition by UV treatment be carried out for areas inside buildings which are contaminated by TCDD, while intense solar radiation is adequate for areas exposed to sunlight.

79-0303. Nose, K. (Inst. Agric. Sci., Minist. Agric. & For., Tokyo, Japan) **[Persistency of herbicides and plant growth regulators in soil. Part 2.]** *Shokucho (Plant Growth Regul.)* 12(4): 2-11; 1978. (Japanese)

Laboratory tests were carried out on 54 herbicides and plant growth regulators during a three year period from April 1975 to March 1978 to determine half-life values for

the compounds in flooded field or upland soils. At an initial concentration of 1.8 ppm to flooded field soil, it took three days for 2,4-D to degrade to half of its original level. At an application concentration of 0.55 ppm to flooded field soil, oxidazon took 98 days to attain its half-life value. Propazine applied at levels of 0.9 ppm to upland soil took 23 days to reach its half-life level. Simazine applied in concentrations of 0.99 ppm to upland soil reached its half-life level at 21 days. The half-life level of morphactin (chlorfluorecol) applied to upland soil at 3.0 ppm was reached in less than a day. In flooded soil, butachlor applied at 1.6 ppm and napropamide applied at 1.2 ppm reached half-life values at 8 and 45 days, respectively. In upland soil, benthiocarb applied at 8.8 ppm reached its half-life concentration at 80 days. Asulam at an initial concentration of 9.5 ppm and maleic hydrazide at an initial level of 9.45 ppm in upland soil attained half-life values at two and three days, respectively. Paraquat applied in 1.0 ppm concentrations to upland soil took longer than 180 days to degrade to half-life levels. Factors affecting degradation in flooded and upland soils are discussed, and include such topics as the role of soil microorganisms, weathering, photodecomposition, herbicide structure, and chemical interactions of herbicides.

79-0304. Mingelgrin, U.; Yariv, S.; Saltzman, S. (Div. Soil. Phys. Chem., Inst. Soils & Water, ARO, Volcani Cent., Bet Dagan, Israel) **Differential infrared spectroscopy in the study of parathion-bentonite complexes.** *Soil Sci. Soc. Am. J.* 42(4): 664-665; 1978. (8 references)

Differential infrared spectroscopy was used to investigate parathion degradation in the adsorbed state. This technique enables observations of the 1,380-1,150 cm region, which is usually overlapping with the strong SiO absorption of bentomites. The appearance of the P=O absorption band upon heating clay-parathion complexes, in cnojunction with other tests, confirmed that parathion degradation on bentomites occurs mainly via a rearrangement reaction. (At the 42nd Annu. Mtg. 1978) (Author abstract by permission)

79-0305. Winell, B.; Johansson, C. E. (Res. Lab., Pripps Brew. AB, S-16186 Bromma, Sweden) **Rester av pesticider i sallad. [Pesticide residues in lettuce.]** *Var Foeda* (7): 258-262:; 1977. (7 references) (Swedish)

Eighty-nine imported lettuce samples were analyzed for pesticide residues. The bromide residues ranged from 2 to 205 mg/kg in 60 samples; there were no residues in 29 samples. The quintozene (PCNB) residues were in a range of 0.015-3.1 mg/kg, the pentachloroaniline (PCA) levels were in the range 0.024-1.8 mg/kg. The quintozene + PCA level exceeded the new Swedish tolerance of 1 mg/kg in 44/67 samples from the Netherlands, and the bromide level exceeded 30 mg/kg in 22 samples. Both tolerances were exceeded in 13 samples. Dithiocarbamate residues were found in 13 samples, with 1.8 mg/kg as the highest value, vs. a tolerance of 1 mg/kg. Lindane was found in 10 samples, with a maximum of 58 mg/kg in one. Ethylene thiourea could not be detected in any sample at a sensitivity of 0.01 mg/kg.

79-0306. Wolfe, N. L.; Zepp, R. G.; Paris, D. F. (Environ. Res. Lab., EPA, Athens, GA) **Use of structure-reactivity relationships to estimate hydrolytic persistence of carbamate pesticides.** *Water Res.* 12(8): 561-563; 1978. (14 references)

The use of free energy relationships to estimate alkaline hydrolysis rate constants of carbamate pesticides is examined as a possible useful means of predicting hydrolytic stability of these pesticides in aquatic ecosystems. When plots were drawn of the second-order alkaline hydrolysis rate constants versus the pK_a of the resulting alcohols formed upon hydrolysis, it was demonstrated that many carbamate pesticides will not readily hydrolyze in natural waters. Hydrolysis will likely be a fast enough pathway of degradation to be of some significance only in the case of *N*-substituted carbamates for which result alcohols with pK_a's less than 12. The use of kinetic studies such as this one in evaluating the fate of many carbamates in aquatic systems in the environment is appraised.

79-0307. Wolfe, N. L.; Zepp, R. G.; Paris, D. F. (Environ. Res. Lab. US EPA, Athens, GA) **Carbaryl, propham and chlorpropham: a comparison of the rates of hydrolysis and photolysis with the rate of biolysis.** *Water Res* 12(8): 565-571; 1978. (33 references)

The kinetics of hydrolysis and photolysis were studied for carbaryl, propham, and chlorpropham in water. A comparison was made of the calculated half-lives with calculated half-lives for biolysis under a given set of conditions. In sunlight and in distilled water the direct photolysis half-life for carbaryl was 6.6 days. For the direct photolysis of propham and chlorpropham in a clear water body near the surface the calculated minimum half-lives are 254 and 121 days, respectively. Based on second-order fungal rate constants, the half-lives were calculated for propham and chlorpropham. The relative importance of the three degradation processes, hydrolysis, photolysis, and biolysis, were compared by means of kinetic data.

79-0308. Jenkins, D.; Klein, S. A.; Yang, M. S.; Wagenet, R. J.; Biggar, J. W. (Sanit. Eng. Res. Lab., Univ. California, Berkeley, CA) **The accumulation, translocation and degradation of biocides at land wastewater disposal sites: The fate of malathion, carbaryl, diazinon and 2,4-D butoxyethyl ester.** *Water Res.* 12(9): 713-723; 1978. (3 references)

Translocation and accumulation of biocides was measured at various depths using both lysimeter and field plot studies. When applied at 100 μg/l, carbaryl did not translocate with soil water nor accumulate in soils. Diazinon did not accumulate in soils except when they were highly organic type soils. Diazinon also accumulated, but only in the surface layers, of finely-textured soils. Only the surface layer of soils contained malathion. No translocation or accumulation of 2,4-D was noted in the soils tested in the lysimeter studies. Evaporation did not account for large losses of organophosphate biocides or their oxons. In field plot studies carbaryl did not accumulate nor translocate through the soils. 2,4-D did not appreciably accumulate in either soil when applied in spray-irrigated wastewater. No accumulation of diazinon

was noted, and malathion did not accumulate in soils nor translocate in the waters through the soils.

79-0309. Suzuki, M.; Yamato, Y.; Akiyama, T. (Kitakyushu Munic. Inst. Environ. Health Sci. Kitakyushu, 804 Japan.) **Fate of herbicide CNP in rivers and agricultural drainages.** *Water Res.* 12(10): 777-781; 1978. (16 references)

A method for the analysis of CNP in water samples is described which uses macroreticular resin XAD-2 columns. Good recoveries were obtained at all concentrations tested; excellent results were obtained at 0.1 μg/l with an average recovery of 99.3%. Tests were made on water taken from rivers and agricultural drainage areas in the Kitakyushu district in Japan. CNP was more persistent in the aqueous environments than was benthiocarb. CNP residual concentrations were 0.01 to 16.67 μg/l with the maximum detected level being reached within a months time from the beginning of rice seedling transplantation in paddy fields. After flooded water had been drained from the paddy fields, no residue was detected. The use of macroreticular XAD-2 resins showed quantitative adsorption-desorption kinetics with known concentrations. CNP residues in the water samples were identified by means of a combined gas chromatography - mass spectrometry - computer system.

79-0310. Hance, R. J.; Smith, P. D.; Cotterill, E. G. (Agric. Res. Counc., Weed Res. Org., Yarnton, Oxford OX5 1PF, England) **The effect of age on the availability of linuron and simazine residues in soil.** *Weed Res.* 17(6): 429-431; 1977. (18 references)

Residues of the herbicides linuron and simazine in fields both 20 wk after treatment and approximately 5 yr after treatment were compared. The residues in the soil samples were measured by bioassay (using ryegrass) and by gas chromatography. In all the tests, there was no significant difference in the results obtained by the two methods. In a field treated with 112 kg/ha of linuron in the spring of 1971 and sampled in the fall of 1975, the residue estimates by gas chromatography were 0.68 ± 0.04 ppm, while the results obtained by bioassay were 0.75 ± 0.19. This indicates that the age of the residue does not affect the relationship between extractable herbicide and that available to the plant. There is no evidence of any active bound (nonextractable) residue.

79-0311. Gaur, A. C.; Misra, K. C. (Div. Microbiol., Indian Agric. Res. Inst., New Delhi, India) **Dynamics of microbial population in soil as influenced by simazine and ecological factors.** *Zentralbl. Bakteriol. Parasitenkd. Infektionskr. Hyg. Abt 2* 133(3): 357-361; 1978. (12 references)

The effects of simazine on soil bacteria (*Azotobacter*), actinomycetes, and fungi under the influence of varying soil organic matter content, temperature, pH, and moisture regime were studied. Simazine depressed the bacterial population significantly even at normal rates of field application. The toxic effects were more pronounced at higher levels of simazine application. Simazine applications made to soil amended with FYM (fertilizer) at levels of 0.5 and 2.0% decreased bacterial populations similar to that of the unamended soils. This effect was noted at both 30 and 45°C but the toxic effect was not noticed at 15°C. The normal rate (2.0 ppm) of applicaton of simazinr was not harmful in acidic or alkaline soils, but was harmful in neutral soil. The number of actinomycetes was not affected up to 20 ppm. *Azotobacter* populations were significantly increased at field application rates, whereas higher levels, up to 200 ppm, had no adverse effects. The use of simazine at different concentrations reduced soil fungal populations during the entire test period.

See also 79-0254, 79-0313 *and* 79-0447.

79-0312. Crosby, D. G. (Dep. Environ. Toxicol., Univ. California, Davis, CA 05610) **Conquering the monster--the photochemical destruction of chlorodioxins.** *Adv. Chem. Ser.* 73-1-12; 1978. (22 references)

The chemical 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) is commonly found in many other types of organic compounds. TCDD has an acute toxicity, and causes mutagenic changes, is embryotoxic, and causes skin disorders at low exposure levels. Until recently, TCDD was thought to be inert to chemical or biological breakdown. TCDD undergoes photoreduction caused by UV light, although the chemical mechanism is unknown. Three factors are necessary for successful photoreduction of TCDD: availability of UV light, absorption of the UV light by the chemical, and the availability of a hydrogen-donating solvent. The UV light is available and accessible through sunlight in most areas of the world. The hydrogen donating solvent could be the formulating agent, or natural organic films. The recent TCDD disaster at Seveso, Italy is discussed in relationship to these findings.

79-0313. Plimmer, J. R. (Org. Chem. Synth. Lab., Fed. Res. Sci. & Educ. Adm., USDA, Beltsville, MD 20705) **Approaches to decontamination or disposal of pesticides: photodecomposition.** *Adv. Chem. Ser.* 73:13-23; 1978. (21 references)

Disposal of unused pesticides may be accomplished by incineration, soil disposal, chemical treatment, microbial action and irradiation. The use of photochemical degradation as a method for pesticide disposal is examined in depth. The rate of photochemical degradation is dependent on the amount, type, and the absorption of the radiation. Use of sensitizers to act as catalysts often aid in the decomposition. Sensitization may occur through transfer of energy or charge transfer. The nature of the photochemical degradation products is important. The actual mechanisms of photochemical decomposition are unknown, and often complex by-products result from the process. Cost estimates for photochemical degradation vary from chemical to chemical, but could be lowered as technology improves. Further study is needed to fully examine the potential of photochemical degradation as a safe pesticide disposal method.

79-0314. Kranich, W. L.; LaPierre, R. B.; Guczi, L.; Weiss, A. H. (Dep. Chem. Eng., Worcester Polytech. Inst., Worcester, MA 01609) **Catalytic hydrodechlorination of polychlorinated hydrocarbons.** *Adv. Chem. Ser.* 73: 24-34; 1978. (3 references)

A process for the catalytic hydrodechlorination of chlorinated pesticides (DDT, toxaphene, dieldrin and aldrin) and other environmentally undesirable compounds (PCB) is described. Studies show that the chlorines can be catalytically replaced by hydrogen to the desired degree. By-products of the conversion are generally high boiling oils which may be used or burned. Reaction models for the process are proposed, along with the relative rate constants for the reactions of several hydrodechlorinations. Olefinic and aromatic chlorine compounds are more easily dechlorinated than aliphatic compounds by the process. Highly bridged, non-planar molecules such as aldrin and dieldrin are difficult to hydrodechlorinate completely by this process.

79-0315. Bailin, L. J.; Hertzler, B. L.; Oberacker, D. A. (Dep. Chem., Lockheed Palo Alto Res. Lab., Palo Alto, CA 94304) **Detoxification of pesticides and hazardous wastes by the microwave plasma process.** *Adv. Chem. Ser.* 73: 49-72; 1978. (14 references)

Pesticides and other hazardous wastes have been successfully detoxified using a microwave-induced oxygen plasma. Conversion efficiencies and product identities were determined by material passage through a laboratory-size reactor. An explanded-volume system increased the output from 1-5 g/hr for the small unit to 450-3200 g/hr for the larger system. Oxygen proved to be the best inducer of the plasma. PCB, methyl bromide, polyaromatic dyes, phenylmercuric acetate (PMA), malathion and kepone (chlordecone) were treated using this method. The detoxification of phenylmercuric acetate yielded metallic mercury. Costs of treatment by the microwave induced oxygen plasma method, calculated to include electricity, labor, and equipment, run about 0.19 per 0.455 kg.

79-0316. Wilkinson, R. R.; Lawless, E. W.; Meiners, A. F.; Ferguson, T. L.; Kelson, G. L.; Hopkins, F. C. (Midwest Res. Inst., Kansas City, MO 64110) **State of the art report on pesticide disposal research.** *Adv. Chem. Ser.* 73: 73-80; 1978. (22 references)

This review of pesticide disposal methods represents recent research interests in this field. The review includes advantages, disadvantages, costs, and limitations of each process. The use of high temperature incineration is efficient (99.9%), but requires large initial capital investments. Further treatment of the by-products is often necessary. The effect of this method on large groups of pesticides have not been examined. Chemical treatment processes include wet oxidation, chlorolysis, and ozone/UV irradiation. The uses, problems, and costs of each of these methods are examined and compared, but only limited applications of each of these methods are possible. Biodetoxification of pesticides is also discussed. Work on this method has been limited, with only a few successful cases of use reported.

79-0317. Kennedy, M. V.; Holloman, M. E.; Hutto, F. Y. (Dep. Biochem., Mississippi State Univ., Mississippi State, MS 39762) **Thermal degradation of selected fungicides and insecticides.** *Adv. Chem. Ser.* 73: 81-99; 1978. (23 references)

The degradation in both closed and open systems was investigated for six fungicides and insecticides. These pesticides were captan, maneb, mirex, temik (aldicarb), methyl parathion and toxaphene. Evidence shows vaporization prior to degradation could occur in an open system. Sealed ampoules were heated to the point where the infrared spectra changed, marking the beginning of degradation. The degra-

dation temperatures ranged from 175°C for temik to 525°C for mirex. The gaseous by-products, identified by gas chromatography and mass spectrometry, included HCN, H_2S, NO_2, HCl, COS, CS_2, SO_2, $CHCl_3$, CCl_4, $COCl_2$, and C_2H_3Cl. The complete combustion by-products, predicted from a series of chemical equilibria composition calculations, include CO, CO_2, N_2, NO, Cl_2, SO_2, SO_3, $MnSO_4$, H_2O, HCl, PO_2, P_4O_6, and P_4O_{10}.

79-0318. Rogers, C. J.; Allen, R. (US Environ. Prot. Agency, Cincinnati, OH 45268) **Developing technology for detoxification of pesticides and other hazardous materials.** *Adv. Chem. Ser.* 73: 100-111; 1978.

A review is given of the pit disposal method for disposal of pesticides and other hazardous material. A pesticide pit at Iowa State University, Ames Iowa has been in use for 7 yr for the disposal of 22 different pesticides. Water and soil samples have been analyzed, showed there is no build-up of pesticide residues in the pit. This finding has been substantiated by chemical and microbial data. Inhomogeneities of pesticide distribution do exist. Minipit experiments are being performed to determine possible degradation trends and the fate of the pesticides in this type of pit.

79-0319. Layton, B. R.; Alley, E. G. (Mississippi State Chem. Lab., Mississippi State, MS 39762) **Pyrolysis and disposal of mirex residues.** *Adv. Chem. Ser.* 73: 112-117; 1978. (10 references)

A series of studies was performed to determine the best methods of disposing of mirex. It was found that the compound is thermally stable and resistant to most oxidizing and reducing systems. Photochemical dechlorination was observed. Hexachlorobenzene was formed by heating at 550°C for 5 min. Lower temperatures did not result in as complete a breakdown. Chemical extraction of mirex from shipping containers was tested, showing that hexane and methyl chloride were suitable, but the method was expensive. Conclusions drawn were that mirex-contaminated shipping containers should be disposed of in a high temperature incinerator or be re-used.

79-0320. Yosim, S. J.; Barclay, K. M.; Grantham, L. F. (Atomics Int. Div., Rockwell Int. Canoga Park, CA 91304) **Destruction of pesticides and pesticide containers by molten salt combustion.** *Adv. Chem. Ser.* 73: 118-130; 1978.

Studies on the destruction of pesticide contaminated containers by molten salt combustion are presented. Materials to be combusted are passed into the melt, and gases produced by combustion must pass through the melt before they are emitted into the atmosphere. Theoretically, CO_2, H_2O, N_2, are the only components of the released gas. Destruction of pesticides are greater than 99.9%. No pesticide was detected in the melt; however, traces (0.3 to 1.4 mg/m^3) were detected in the off-gas. Molten Na_2CO_3 or K_2CO_3 was used to destroy 2,4-D, chlordane, malathion, and DDT. Temperatures ranged from 894° to 922°C. Systems currently in operation are discussed and the advantages of molten salt combustion are presented.

79-0321. Merrill, E. W.; Marby, D. R.; Schulz, R. B.; Coleman, W. D.; Trump, J. G.; Wright, K. A. (Massachusetts Inst. Technol., Cambridge, MA) **Destruction of trace toxic compounds in water and sludge by ionizing radiation.** *AIChE Symp. Ser.* 74(178): 245-250; 1978. (4 references)

The destructive effects of ionizing radiation of pesticides in sludge are investigated. The herbicide monuron and two PCB's (3,4,2′-trichlorobiphenyl and 4-chlorobiphenyl) were electron irradiated in water solutions, and degradation products were analyzed by high pressure liquid chromatography (HPLC). Doses of 10 kilorads or less caused greater than 96% disappearance of the pesticides. Other studies included dissolving PCB's in lipid before irradiation. PCB's dissolved in hexane required dosages of 5 megarads for destruction. Dosages required to achieve degradation decreased as more polar or aqueous solvents were used.

79-0322. Tobin, J. S. (American Cyanamid Co., Wayne, NJ 07470) **Organophosphorus poisoning-a letter to the editor.** *Ann. Intern. Med.* 89(4): 579; 1978.

A letter to the editor of *Ann. Intern. Med.* is presented commenting on a previously published case report of organophosphorous poisoning in which a girl ingested 150 ml. of malathion in xylene. The writer of the letter submits arguments against the case being a case of organophosphate intoxication. In the argument, symptoms reported in the original case report are refuted as being appropriate symptoms. They are: labored breathing, muscular cramps, opthalmoplegia, and inactivated cholinesterase inhibitor. The case resulted in the death of a fetus (the poisoning incidence occurred in the first trimester of pregnancy); however, the writer of the letter assumes that no teratogenic response was found because no mention was made of examination of the fetus.

79-0323. Gadoth, N. (Soroka Med. Cent., Ben Gurion Univ., Beersheba, Israel) **Organophosphorus poisoning-a reply.** *Ann. Intern. Med.* 89(4): 579; 1978. (3 references)

A response is presented to a letter to the editor of *Ann. Intern. Med.* refuting the findings of a case report of an organophosphorous poisoning. The refutation concluded that the case could not have been organophosphorous poisoning because 1) a series of symptoms were not generally associated with this type of poisoning 2) the treatment was not sufficient to have been successful, and 3) no teratogenic response could be ascribed to the poison because no examination was made of an aborted fetus (reported in the case report to be a result of the poisoning). The response, by the author of the case report, gave reasons why it was believed that the case was organophosphorous poisoning. His argument included: 1) a significant reduction in pseudocholinesterase inhibition, 2) the occurrence of symptoms previously observed in organophosphorous poisoning, and 3) reduced treatment that had previously been successful in treating this type of poisoning.

Articles reporting teratogenic effects of organophosphorous poisoning in humans were cited.

79-0324. Overstreet, R. M.; Howse, H. D. (Parasitol. Sec., Gulf Coast Res. Lab., Ocean Springs, MS 39564) **Some parasites and diseases of estuarine fishes in polluted habitats of Mississippi.** *Ann. N. Y. Acad. Sci.* 298: 427-462; 1977. (95 references)

A review is presented of a series of studies on diseases of shellfish and finfish in estuaries suspected of or known to be polluted with organophosphorous and chlorinated hydrocarbon insecticides (chlordane, endrin, and DDT), oil, phenols, heavy metals and/or sewage. Diseases observed were lymphocystis, neoplasia, hyperplasia, various viral and bacterial infections, as well as many parasitic infections involving helminths and protozoans. The authors state that pollutants can cause disease directly, resulting in acute to chronic disease. Indirect causation can also occur, resulting from fish becoming weakened and having their defenses lowered. When this occurs, the animals become vulnerable to parasites and other disease agents. The paper does not report cause and effect relationships, nor does it relate specific diseases to specific pollutants.

79-0325. Newhouse, M.; McEvoy, D.; Rosenthal, D. (Dep. Med., St. Joseph Hosp., Hamilton, Ont., Canada) **Percutaneous paraquat absorption.** *Arch. Dermatol.* 114(10): 1516-1519; 1978. (20 references)

A 39-yr old woman, who frequently worked with paraquat in orchards, was admitted to the hospital after minor scratches on her arms and legs developed raised lesions, exuding clear or bloody fluids. Other symptoms included headache, breathlessness, chest tightness, anorexia and weight loss. Biopsy from the ulcerated lesions showed necrosis of the epidermis and dermis. Pulmonary function studies revealed moderate restrictive ventilatory defect. Within 14 days of topical therapy with Burrow's solution compress and petroleum gauze, marked improvement was evident and she was sent home. Seventeen days later she was readmitted with symptoms of dyspnea, cough, fever, nausea/vomiting, and new lesions. Progressive deterioration included hepatic and renal dysfunction, extensive coagulative necrosis of the skin down to the fat, and respiratory failure. She died 12 days later. Histopathological findings, together with similarities to previously described paraquat poisoning in animals pointed to pesticide poisoning. Studies have shown that paraquat is normally not inhaled to toxic doses during normal application. Presumably only small quantities at any one time were absorbed by the woman's skin, however, the cumulative doses may have been considerable. The long term interval between exposure and death may have been due to small doses and the route of entry of the pesticide.

79-0326. Mendelssohn, H.; Paz, U. (Dep. Zool., Tel-Aviv Univ., Tel-Aviv, Israel.) **Mass mortality of birds of prey caused by azodrin, an organophosphorus insecticide.** *Biol. Conserv.* 11(3): 163-170; 1977. (29 references)

Widespread secondary poisoning resulting from the persistent organophosphorus pesticides already present in the environment is reported in the Huleh Valley in Israel with the affected species having raptors and owls which had fed on Azodrin (monocrotophos) poisoned voles and birds. The pesticide had been used on fields of alfalfa in an effort to control a massive infestation of voles which were destroying the crop completely in some places. While this pesticide is recommended for use in Israel only for the control of pests on cotton and in orchards, the dangers of the chemical to wildlife do not appear in the Hebrew translation on the original label. About 400 birds of prey were destroyed on an 8 km^2 area within a three mo period.

79-0327. Youness, E.; Ahearn, M. J.; Drewinko, B. (Dep. Lab. Med., M.D. Anderson Hosp. & Tumor Inst. Houston, TX 77030) **Simultaneous occurrence of non-Hodgkin's lymphoma and spontaneous acute granulocytic leukemia.** *Am. J. Clin. Pathol.* 70(3): 415-420; 1978. (32 references)

A case is presented in which a 67-yr old farmer who experienced chronic exposure to some form of insecticide suffered from weakness, anemia, and fluctuating platelet counts. Following extensive testing, his condition was diagnosed as non-Hodgkins lymphoma with superimposed acute granulocytic leukemia. A discussion of the treatment is given. This is the second case of these two diseases occurring simultaneously in the absence of a history of chemotherapy, radiotherapy, or both. It is suspected that the chronic exposure to an unknown insecticide may have played a leukomogenic role.

79-0328. Shea, P. J. (Pac. Southwest For. & Range Exp. Stn., USDA For. Serv., Davis, CA 95616) **Testing of chemical and microbial insecticides for safety. Some techniques.** *Bull. Entomol. Soc. Am.* 25(5): 176-178; 1977. (5 references)

A cooperative three year study was started in 1975 to investigate the effects of three chemical insecticides, dimilin (diflubenzuron), orthene (acephate), and sevin (carbaryl) 4-oil, on nontarget organisms found in a typical eastern Oregon Douglas fir/mixed conifer forest. The deposit of spray was monitored and analyses were carried out on all plots for all materials in the residue study including the Douglas-fir, alder, grass, soil, stream sediment, and water. Studies were made on ants, yellowjackets, domestic bees and wild pollinators along with selected forest Diptera. The aquatic insect populations were studied by several sampling regimes and techniques. Studies were also made of mammals and birds in the area sprayed. The results of this study are expected to be exceedingly complete due to the comprehensiveness of the investigation. One major strength of the studies is the cooperative and coordinated manner under which the whole project has been conducted.

79-0329. Hayes, W. J. Jr.; Vaughn, W. K. (Sch. Med. Vanderbilt Univ., Nashville, TN 37232) **Mortality from pesti-**

cides in US in 1973 and 1974. *Clin. Med.* 85(8): 32-33; 1978.

Pesticides were implicated in 61 deaths in 1973 and in 52 cases in 1974. A total of 78 accidental deaths occurred during the two year period (45 in 1973, 33 in 1974). This is a considerable drop from earlier years and was accompanied by a reduction in the number of poisonings in children. Most of the poisonings were accidental and non-occupational. A disporportionate number involved males and nonwhites. Suicides accounted for 12 deaths in 1973 and 10 in 1974. Three cases of murders involved the use of pesticides over the two year period. No new cases of death caused by aerosol without willful misuse were found.

79-0330. Richards, D. M. T. (Univ. California, Davis, CA) **Methodological considerations in the epidemiological evaluation of occupational exposure to organophosphate pesticides.** *Diss. Abstr. Inst. B* 39(3): 1223-1224; 1978.

The epidemiological requirements for valid field research on occupational exposure to organophosphate (OP) pesticide residues were presented. Specific issues addressed included: the environmental, physiological variables that should be monitored, the procedures for cholinesterase (CHE) analysis, sample size considerations, indices of significant CHE depression, selecting the appropriate study population, and medical-ethical safeguards. It was recommended that ambient temperature, incident sunlight, wind speed and direction, and soil moisture be monitored for the duration of all reentry interval (REI) research. Several prerequistes for establishing a satisfatory procedure for CHE analysis were recommended, including the daily assay of a standard enzyme source, and the determination by each laboratory of the normal mean, standard deviation, and range of male and female CHE activity, as well as a standard decay curve of enzyme activity over time in storage. The section on sample size considerations emphazised the need to minimize Type II statistical errors in the interests of fieldworker protection. Such errors reject the existence of a true adverse response to OP residue exposure. A combination of several indices was recommended to assess group response to OP residue exposure. These included Dunnett's one-tailed t-test, supported by an evaluation of the overall trend in group-mean CHE activity and the proportion of the study population showing significant individual depression greater than their calculated least significant difference. A model was developed for the systematic interpretation of REI research using the recommended indices of adverse CHE depression. The model classified the results into three possible response categories: "no effect", "moderate effect" and "major effect". Four companion studies consisting of two fieldworker monitoring surveys and two exposure-control projects were presented along with a study of CHE activity in Mexican-American males and females free from known exposure to CHE inhibitors. No evidence was found of adverse response to the conditions. No evidence was found of adverse response to the conditions of OP residue exposure monitored. Average individual ACHE variation was found to be 3.0 ± 1.0 % of mean activity for males and 3.8 ± 0.9 % for females. Group-mean variation in ACHE activity was 6.6 ± 1.0 % for males, and 8.5 ± 0.7 % for females. Female ACHE activity did not appear to fluctuate with the menstrual cycle. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 7815516)

79-0331. Parks, M. (Author address not given.) **The Seveso Case.** *EPA J.* 4(8): 11-15, 35; 1978.

On Saturday, July 10, 1976, an explosion in a chemical plant spread TCDD over the surrounding countryside in Seveso, Italy. The toxicity of TCDD, a teratogen, is extreme. The most conspicuous symptom of exposure is chloracne, a severe skin disease resistant to treatment. Hirsutism, an unnatural and disfiguring growth of hair over the forehead and sides of the face may also result, along with serious damage to the liver and kidney. Debility and psychoneurotic reactions are also known. At first the estimates of area contaminated were in the range of 26.8 acres. Currently, some 150 acres have been sealed off from any access and will remain unusable for at least 10 yr, perhaps longer. By Monday and Tuesday after the explosion some adults in the surrounding areas reported illness and children were suffering body rashes. Domestic animals began to die by Tuesday. Hundreds of birds were found dead on the ground along with field mice and moles. On Friday the 16th destruction was ordered of vegetation and animals in the danger zone to prevent further danger from the contaminant. Only after 10 days was it confirmed that the poison which was at work was TCDD. Immediately 444 people were evacuated and 80 children sent to a summer camp. The final estimate of the amount of soil into which TCDD had penetrated and lodged, by depth and area, was 49,500 kg. Removal was seen as impossible and burning was ruled out due to the carrying of contaminated smoke and ash by the wind. Evacuation increased to 750 individuals. Efforts made along the lines of cleaning the homes and schools in the area are recounted and it is noted that even after the schools were cleansed and reopened, some 200 children developed skin rashes. The increased number of abortions in light of the teratogenicity of TCDD is discussed with no clear cut evidence presented on whether there would have been birth defects which could be charged to the explosion or not. Medical monitoring, continuing land decontamination studies, and maintenance of vigilance over the closed area and its contaminated holdings are currently being conducted.

79-0332. Tamura, O. (Author address not given) **Organophosphorus pesticides as a cause of myopia in school children: an epidemiological study.** *Excerpta Med. Int. Congr. Ser.* 442:31; 1978.

Between the years 1957 and 1973 the incidence of myopia in school children in the Tokushima Prefecture was measured. During the same time period, the use of organophosphorous pesticides was statistically monitored in the Prefecture. The results of these epidemiological and statistical studies have shown a definite correlation between the amounts of organophosphorus pesticides used one year and the incidence of myopia in the following year among the

school children. The heavier the use of the pesticides, the more frequent the incidence of myopia the following year among the school children. No correlation was noted between the incidence of myopia and the use of either carbamate or organochlorine pesticides.

79-0333. Ishikawa, S. (Author address not given) **Ocular manifestations by chronic organophosphate pesticide intoxication.** *Excerpta Med. Int. Congr. Ser.* 442: 31; 1978.

Severe myopia with corneal astigmatism, disturbance of the smooth pursuit eye movement, prolonged latency and reduced amplitude of the pupillary light reflex, and optic neuropathy was observed in approximately 60 children. These children lived in an area in Japan where extensive use of organophosphate pesticides was common practice. In these same children, minor neurological abnormalities were noted with cholinergic signs. A reduction of cholinesterase activity was found in about one third of the cases. Atropine and 2-PAM used in extensive treatment of these children resulted in an improvement in their vision. The reported symptoms were contributed to chronic exposure to organophosphhate chemicals.

79-0334. Tsyrkunov, L. P. (Inst. Ind. Hyg. & Occup. Dis., Kiev, USSR) **Khimicheskie dermatozy ot vozdeistviya nitrofena. [Chemical dermotosis due to exposure to nitrophen.]** *Gig. Tr. Prof. Zabol.* (7): 48-49; 1978. (Russian)

A 64-yr-old man developed rash, dryness of the skin, and sloughing of the hands and fingers following accidental contact with nitrofen spray. There were no other subjective and objective symptoms. A 38-yr-old tractor driver developed pruritus of the hands and forearms, headache, malaise, abdominal pains with dyspeptic symptoms 3-4 days after skin contact with the inhalation of nitrofen spray during spraying of an orchard under the usual circumstances. He also developed eczema and toxic hepatitis with cholecystitis. The skin alterations changed only slightly during the subsequent 2-yr exposure-free period.

79-0335. Kelly, D. F.; Morgan, D. G.; Darke, P. G. G.; Gibbs, C.; Pearson, H.; Weaver, B. M. Q. (Dep. Pathol., Med. Sch., Univ. Bristol, Bristol BS8 1TD, England) **Pathology of acute respiratory distress in the dog associated with paraquat poisoning.** *J. Comp. Pathol.* 88(2): 275-294; 1978. (32 references)

In order to more fully document the lesions produced in animals by paraquat poisoning, ten dogs suffering from paraquat-induced respiratory distress were studied. The animals were necropsied shortly after death, lung tissue was studied by electron microscopy, and other tissues (alimentary tract, kidney, adrenal gland and heart) were examined histopathologically. While gross examination of the lungs showed hemorrhages and pulmonary edema of varying severity, gross changes in other organs were uncommon. Microscopic examination of lung tissue showed congestion of alveolar septal capillaries by edema fluid and red blood cells, alveolar fibrosis, and hyperplasia of bronchiolar epithelial cells. Most of the dogs had areas of tubular necrosis throughout the kidney cortices. Half of the dogs showed evidence of adrenocortial necrosis, and in the four dogs in which heart tissue was examined, areas of necrosis in the myocardium were found.

79-0336. Stowe, C. M.; Fangmann, G.; Arendt, T. (Author address not given) **Toxicity of household and street drugs in small animals.** *J. Am. Vet. Med. Assoc.* 173(7): 866; 1978.

A review of the frequency of small animal intoxication over the past 5 years at the Veterinary Teaching Hospital and the Diagnostic Laboratory, University of Minnesota revealed that intoxications due to household and street drugs, although not as common as rodenticides or heavy metals, nevertheless constituted an ongoing hazard in dogs and cats. Specific toxicants included marijuana, amphetamines, mescaline, LSD, caffeine, iron compounds, ethylene glycol, antiseptics, and others. These toxicologic problems will be discussed from the standpoint of clinical signs, diagnosis, laboratory identification, and treatment. (Author abstract by permission)

79-0337. Osweiler, G. D. (Author address not given) **Rodenticides as hazards to companion animals.** *J. Am. Vet. Med. Assoc.* 173(7): 866; 1978.

More than 25 chemicals are registered as toxicants for undesired mammals. Most such products are sold through retail outlets. The potential for poisoning by rodenticides is great since mammals are baited in forms generally attractive to pets. Diagnosis of rodenticide toxicosis requires knowledge of availability, evaluation of clinical and pathologic effects, and chemical verification. Toxic effects vary, including effects on the nervous system, blood coagulation, and energy metabolism. Differential diagnosis, prognosis, and evaluation of the hazards to pets will be discussed for the major rodenticides and mammal toxicants. (Author abstract by permission)

79-0338. Buck, W. B.; Bevill, R. F. (Author address not given) **Toxicology of insecticides.** *J. Am. Vet. Med. Assoc.* 173(7): 867; 1978.

Dogs, cats, and caged birds may be especially susceptible to poisoning by the organic insecticides. All three of the major classes of insecticides (organochlorine, organophosphorus, and carbamate) are toutinely used in the household environment, providing ample opportunity for exposure to companion animals. The indiscriminant eating habits of dogs and the fastidious grooming characteristics of cats present unique exposure problems in these 2 species. This presentation will review the toxicology of the 3 classes of insecticides in companion animals including common potential sources of exposure, clinical signs of toxicosis, diagnostic considerations, and therapeutic recommendations. (Author abstract by permission)

79-0339. Frank, A. M.; Sjogren, R. D. (Metrop. Mosq. Control Dist., St. Paul, MN) **Effect of temephos and chlorpyrifos on crustacea.** *Mosq. News* 38(1): 138-139; 1978. (3 references)

Studies were conducted to determine the effects of two mosquito larvacides, temephos and chlorpyrifos, on crustaceans. One hundred twenty-four sites known to be inhabited by crustaceans were treated as follows: 48 were treated with chlorpyrifos at rates of either 0.0228 kg AI/acre or 0.0455 kg AI/acre; 28 were treated with temephos at a rate of 0.0114 kg AI/acre; and 48 were untreated. Field observations, supplemented by collectoins from 30% of the sites (examined in the laboratory) were used to determine the results of the studies. Crustacea, principally copepods, ostracods, amphipods, and cladocerans, were observed in 85% of the samples. There is strong statistically significant evidence that chlorpyrifos has some effect on the occurrence of crustacea, while there is little evidence that temephos affects their occurrence.

79-0340. Widdop, B.; Medd, R. K.; Braithwaite, R. A. (Poisons Unit, Guy's Hosp., London, England) **Charcoal haemoperfusion in the treatment of paraquat poisoning.** *Proc. Eur. Soc. Toxicol.* 18: 156-159; 1977. (5 references)

The effectiveness of charcoal hemoperfusion in the treatment of paraquat poisoning in the dog was tested. Adult beagle dogs were dosed with the equivalent of 10 mg paraquat per kg body weight. The control animals received no treatment, while in the test groups arterio-venous shunts were applied and a hemoperfusion device consisting of a charcoal absorbent coated with a synthetic polymer was used. The animals were perfused for a 10-12 hr period, and the treatment started at various times (between 6 and 18 hr) after paraquat dosing. The amounts of paraquat removed by perfusion and excreted in the urine were measured. All control animals died within 9-12 days after dosing, showing symptoms of progressive respiratory distress and renal impairment. Eight of the nine animals perfused within 12 hr after dosing survived, while those perfused at 18 hr died. In animals treated within 3 hr after dosing, up to 16% of the paraquat dose was removed by perfusion, but the amount removed dropped significantly after that time. In general, the results indicated that early hemoperfusion therapy may become useful in treating human paraquat poisoning.

79-0341. Spitzer, P. R.; Risebrough, R. W.; Walker, W., II; Hernandez, R.; Poole, A.; Puleston, D.; Nisbet, I. C. T. (Author address not given) **Productivity of Ospreys in Connecticut-Long Island. Increases as DDE residues decline.** *Science* 202(4365): 333-335; 1978. (23 references)

Nesting success of ospreys (*Pandion haliaetus*) breeding in the Connecticut-Long Island area has increased since 1973 and is now approaching the levels recorded prior to the 1950's. Simultaneously, DDE and dieldrin residues have declined in unhatched eggs. Levels of polychlorinated biphenyls have shown no changes over the period 1969 to 1976. The increase in productivity is attributed primarily to lower levels of DDE contamination. Detrimental effects in the past on ospreys in the Connecticut River estuary are attributed to local contamination with dieldrin.

79-0342. Knaak, J. B.; Maddy, K. T.; Jackson, T.; Fredrickson, A. S.; Peoples, S. A.; Love, R. (California Dep. Food & Agric., Sacramento, CA 95814) **Cholinesterase activity in blood samples collected from field workers and nonfield workers in California.** *Toxicol. Appl. Pharmacol.* 45(3): 755-770; 1978. (13 references)

Blood samples (1221) were obtained from workers through cooperating physicians in farm worker health clinics during the growing and harvest season for lettuce, grapes, peaches, and citrus in January, May, July, and September, 1975. The blood samples were analyzed for cholinesterase activity using the dual channel Technicon AutoAnalyzer II system. The dual channel system provided for automatic blanking, the use of different buffers for the enzyme (pH 7.7) and color reactions (pH 8.2), and dialyzers to eliminate the interference of blood components with the color reaction. The cholinesterase activity (micromoles of -SH per minute per milliliter) of the red cell was obtained by difference using the activities of whole blood and plasma and the hematocrit of the blood sample. Acetylthiocholine was used as substrate. The mean plasma (8.3) and red cell (27.9) cholinesterase activities of female field workers in the field during the last 30 days. The mean red cell cholinesterase activity (27.7) of male field workers was significantly lower than the red cell activity (29.6) of nonfield workers in 1975 but not different from field workers who had not worked during the last 30 days (27.5) or nonfield workers in 1976 (27.5). The mean plasma cholinesterase activity of male field workers (9.9) was not significantly different from those of nonfield workers (9.4) in 1975 or 1976, whereas field workers who had not worked in the field during the last 30 days had plasma values (8.9) significantly lower than those working. Red cell values of field workers returning for a repeat test were found to increase slightly between the first test and second, although plasma values remained the same. (Author abstract by permission)

79-0343. Adachi, H.; Yokota, T.; Fujihara, S.; Nakamura, H.; Uchino, F. (First Dep. Pathol. Sch. Med., Yamaguchi Univ., Ube 755, Japan) **Two autopsy cases of paraquat poisoning.** *Tokoku J. Exp. Med.* 125(4): 331-339; 1978. (18 references)

Two autopsy cases are reported, the first of which involved a 47-yr-old woman who swallowed about 30 ml of undiluted paraquat to commit suicide. The second case involved a 29 year old male who swallowed a mouthful of undiluted paraquat to commit suicide. The characteristic finding in each of these cases was multiple fibrin thromobi in various-sized vessels. This finding suggests disseminated intravascular coagulation, although the labortory data were not sufficient for clinical diagnosis of this condition. Liver dysfunction, renal failure and pulmonary distress were the main features in these two cases. The lungs demonstrated alveolar fibrosis, hemorrhage, edema and inflammatory cell infiltration. The liver had evidence of toxic injury.

79-0344. Gembitskii, E. V.; Bogdanov, N. A.; Bonitenko, Yu, Yu.; Shapkin, V. I. (Author address not given) **Oslozhneniya i posledstviya ostrykh otravlenii fosfororganicheskimi insektitsidami. [Complications and sequelae of acute poisoning by organophosphorus insecticides.]** *Voen. Med. Zh.* (1): 33-38; 1978. (29 references) (Russian)

The complications and sequelae of acute poisonings by organophosphorus pesticides are reviewed. In severe poisoning, the early psychic disorders are short-lived, and are followed by syndromes of loss of psychic activity (sopor and coma). The acute phase of the poisoning is followed by asthenovegetative disorders (postintoxication asthenia, depression and obsessive disorders), emotional instability, motor disorders, paresis and paralysis, polyneuritis, paralysis of the respiratory musculature, pneumonia, atelectases, and chronic inflammatory processes in the bronchopulmonary system due to acute bronchitis and pneumonia in many cases.

79-0345. Jastroch, S.; Knoll, W.; Lange, B.; Riemer, F.; Thiele, E. (Ernst Moritz Arndt Univ., Greifswald, DDR) **Untersuchungsergebnisse zur Exposition gegenueber Dinitro-*o*-kresol (DNOC) beu Agrochemikern. [Results of exposure to dinitro-*o*-cresol among agrochemists.]** *Z. Gesamte Hyg. Ihre Grenzgeb.* 24(5): 340-343; 1978. (20 references) (German)

A total of 40 employees of 5 agrochemical centers exposed to DNOC either in 1975, 1976 or in both years were screened to determine the length of contact with DNOC, the concentrations they were exposed to, and in 11 of these workers DNOC blood levels were determined 12 to 18 hr following exposure with the view of assessing the potential health hazard to which these workers are exposed and instituting appropriate precautionary measures. One case of subacute DNOC intoxication requiring hospitalization was observed over a period of several weeks to detect the relationship between decreasing DNOC blood levels and diagnostic parameters. The month of August was found to be the critical month of exposure to DNOC. The median atmospheric concentration at work places was found to be 0.103 $\mu g/m^3$ or 52% of the maximum permissible level of 0.2 $\mu g/m^3$. Blood levels of from 9 to 69 $\mu g/ml$ resulted in nausea, sweating and weakness, and a yellow coloring of hands, nails and hair. The recommendation to discontinue the use of DNOC as an herbicide in agriculture is made.

See also **79-0254, 79-0266, 79-0406** *and* **79-0447.**

79-0346. Verma, S. R.; Bhatnagar, M. C.; Dalela, R. C. (Unit Pollut. Relevant Res., Dep. Zool., D.A.V. Coll., Muzaffarnagar, India) **Biocides in relation to water pollution. Part 2. Bioassay studies of few biocides to a fresh water fish, *Channa gachua*.** *Acta Hydrochim. Hydrobiol.* 6(2): 137-144; 1978. (23 references)

Zolone (phosalone), Rogor (dimethoate), Sumithion (fenitrothion), and Abate (temephos) were evaluated for toxicity using *Channa gachua* as a test fish. Experiments were conducted at 24, 48, 72, and 96 hr intervals. During the experimental period the fish exhibited several changed physical modes of behavior such as increased opercular movements, fast jerky movements and erratic swimming. Zolone was the most highly toxic and Abate the least toxic of the tested chemicals. Sumithion was slightly more toxic than Abate and Rogor more toxic than Sumithion. When the temperature was raised from 24 to 30°C the mortality percentage increased continuously for all the time intervals. When the pH of water changed from 7.2 to 7.9, an increase in the toxicity of the biocides in soft water was noted. In hard water the fish died at a slower rate. Permissible concentrations of each biocide examined are calculated to be 0.02437 mg/l for Zolone, 1.3733 mg/l for Rogor, 3.6907 mg/l for Sumithion and 66.678 mg/l for Abate. These values are for practical use in regulating discharge of effluents of these biocides from any source.

79-0347. Helmeczi, B. (Inst. Soil Sci. Microbiol., Univ. Agric. Sci., Debrecen, Hungary) **Effect of herbicides on the growth and N-fixing capacity of *Azotobacter chroococcum*.** *Acta Microbiol. Acad. Sci. Hung.* 25(2): 145-146; 1978.

The effects of herbicides on growth and N-fixation of *Azotobacter* were studied. The herbicides could be grouped as stimulators [Nitrikol, Ramrod (propachlor), Buvinol, or Sys 67 ME] and inhibitors [Gramoxone (paraquat), Hungaria K 64, Dikotex (MCPA), Aniten (flurenol), Afalon (linuron), Satecid or Pyramin (pyrazon and dalapon)] of bacterial growth and N-fixation. Herbicides which had no effect were classified as neutrals [Hungazin PK, NaTa (TCA) and Banvel (dicamba)]. The combination which exhibited the greatest growth inhibition was Satecid AT + methyl carbamate + propachlor 40 EC + Aktikon 90 WP. [At the 1977 Annual meeting of the Hungarian Society of Microbiology.]

79-0348. Cserhati, T.; Kecskes, M. (Res. Inst. Plant Prot., Budapest, Hundary) **Effect of surfactants applied in pesticide formulations on the physiological activity of soil microbes.** *Acta Microbiol. Acad. Sci. Hung.* 25(2): 146; 1978.

A study is presented in which soil microorganisms were exposed to surfactants occurring in pesticides. All surfactants, with the exception of one, inhibited the reducing activity of the microorganisms. Only 68% of the total effect could be explained by a regression between tension decreasing effect and microbial activity. The Hansch constant characteristic for lipophilia of the compounds was determined, but did not account for the biological activity. It is concluded that Hansch constants reported in the literature cannot be used to estimate biological activity of surfactants. [At the 1977 Annual Meeting of the Hungarian Society of Microbiology.]

79-0349. Lakatos, E.; Horvath, L.; Pozsar, B. I. (Inst. Isot., Hung. Acad. Sci., Budapest, Hungary) **Biological stability of [$^{14}CH_3$]6-methyl uracil in plants and its biodegradation by soil microorganisms.** *Acta Microbiol. Acad. Sci. Hung.* 25(2): 146-147; 1978.

The biological stability of 6-methyl uracil (a decomposition end-product of uracil-type herbicides) was determined using pinto bean plants. Levels decreased by 15%, 18%, and 33% at the end of the 1, wk 1, and wk 2, respectively. Decompositon of 6-methyl uracil is not due to demethylation. Degradation in soil is associated with soil algae. [At the 1977 Annual Meeting of the Hungarian Society of Microbiology.]

79-0350. Dobolyi, C.; Kecskes, M. (Natl. Inst. Hyg., Budapest, Hungary) **Effect of interactions of zoocides and linuron herbicide on bacterial and fungal strains.** *Acta Microbiol. Acad. Sci. Hung.* 25(2): 147; 1978.

Preparations of prothoate and phosphorodithioate with increased stimulating effects were studied on 17 strains of microorganisms by microfermentor and biophotometer tests. At concentrations of 10 ppm growth was stimulated in 7 yeast and yeast-like strains, and 3 strains of filamentous microscopic fungi. Slight inhibition was noted in 3 bacterial genera. Doses of 1-10 ppm phosphamidon had either no effect or very slight influence on the growth of the microbial strains investigated. The maximum inhibitory effect was reached with a combination of linuron, trichlorfon, dimethoate, prothoate, and phosphamidon. [At the 1977 Annual Meeting of the Hungarian Society of Microbiology.]

79-0351. Janos, E.; Cserhati, T. (Res. Inst. Plant Prot., Budapest, Hungary) **Microbiological and chemical decomposition of chlorbromuron in different soils.** *Acta Microbiol. Acad. Sci. Hung.* 25(2): 147-148; 1978.

Studies performed on the decomposition of chlorbromuron in soils showed a logarithmic decrease with time, with evidence of a first-order reaction, linear correlation between incubation time and herbicide concentration. The energy of activation was calculated at 15-16 kcal/mole, significantly smaller than the energy needed for the hydrolytic decomposition of chlorbromuron (20-22 kcal/mole). Microbiol decomposition increased linearly from 10-25°C with a slight decrease at 37°C. [At the 1977 Annual Meeting of the Hungarian Society of Microbiology.]

79-0352. Leiba, S.; Kaufman, H.; Winkelsberg, G.; Bahary, C. M. (Dep. Endocrinol., Beilinson Med. Cent., Tel Aviv Univ., Petah Tikva, Israel) **Pregnancy in a case of Nelson's syndrome.** *Acta Obstet, Gynecol. Scand.* 57(4): 373-375; 1978. (10 references)

A case was reported in which a woman suffering from

Nelson's syndrome (hypoadrenalism with hypersecretion of ACTH and MSH) became pregnant following treatment for Cushing's disease. During the course of the treatment she had been administered *o,p'*-DDD (TDE) a cytotoxic drug specific for adrenal cells. Since the adrenals and gonads are of the same embryological origin, it was a concern that the drug might have had a teratogenic effect on the gonadal cells and affect the patient's offspring. In the 36th week, however, a Caesarean section was performed and a normal baby, weighing 2600 g, was delivered. The post operative course was uneventful.

79-0353. Davison, K. L. (S.E.A. Metab. Radiat. Res. Lab., USDA, Fargo, ND 58102) **Dieldrin elimination from animal tissues.** *Adv. Chem. Ser.* 73: 141-144; 1978. (10 references)

A brief review of research on dieldrin elimination from animals is presented, along with a description of current research on removal of dieldrin from chickens and turkeys. It has been found that when dieldrin is fed to animals, accumulation occurs primarily in adipose tissue and eventually reaches a steady state where excretion of dieldrin equals ingestion. Studies on methods of removing dieldrin from animal tissue have shown that in rats, intermittent periods of starvation increased fecal elimination of dieldrin; while tests on cattle indicated treatment with a combination of phenobarbital and charcoal enhanced the rate of reduction of dieldrin residues in the milk. In current research, turkeys were fed dieldrin to build-up residudes in body tissue. These residues were not affected by several methods of removal; starvation for 5 days followed by regular feeding, treatment with sodium barbital, a high fiber diet, or a high energy high protein diet. Further investigations on chickens and turkeys indicated that starvation severe enough to reduce the amount of body lipid to 10% or less of the dry carcass matter was effective in lowering dieldrin in both animals. The resin cholestyramine was effective in residue removal from chickens, but not from turkeys.

79-0354. Gough, H. C. (Agric. Dev. & Adv. Serv., London SW1P 2AE, England) **Agricultural practices and the soil fauna: introduction.** *Ann. Appl. Biol.* 87(3): 513-514; 1977. (1 reference)

A discussion of some of the problems inherent in studying the soil and its fauna is presented, and mention is made of some of the topics currently being researched. Some of the problems in working with soil fauna are that the soil varies in three dimensions and with time, making accurate sampling difficult; it is difficult to observe what is happening in the soil directly, so study often involves destroying or changing the system; the various groups of organisms will often require separate extraction techniques. The most important soil invertebrate group is the Annelida, which not only mix the soil verticially, but also create channels for the passage of roots and gases. Some of the current agricultural techniques which may be affecting the soil quality are an increase in monoculture and a decrease in crop rotation, extensive use of pesticides, and the introduction of direct drilling rather than the traditional plowing and planting procedures. Some of the current work on pesticides has shown that oxime carbamate nematicides and benzimidazole fungicides are toxic to earthworms, and even some herbicides have effects on the soil fauna.

79-0355. Lundy, P. M.; Magor, G.; Shaw, R. K. (Suffield Biomed. Sect., Def. Res. Estab., Ralston, Alberta TO7 2NO, Canada) **Gamma aminobutyric acid metabolism in different areas of rat brain at the onset of soman-induced convulsions.** *Arch. Int. Pharmacodyn. Ther.* 234(1): 64-73; 1978. (22 references)

In experiments aimed at examining the mechanism of organophosphate induced convulsions and their treatment, groups of 10 animals were injected with LD50 soman alone or soman preceded by the anticonvulsants diazepam, aminooxyacetic acid (AOAA) or n-dipropyl-acetic acid (nDPA) and the severity of convulsions was rated. At appropriate doses diazepam, AOAA and nDPA greatly reduced soman convulsions. Glutamic acid decarboxylase (GAD) and gamma aminobutyric acid transaminase (GABA-T) activities in different brain areas were unaffected by soman in animals sacrificied at the onset of convulsions. Soman also did not change the brain GABA levels. Diazepam and AOAA both abolished convulsions while diazepam had no effect on either of the measured parameters of GABA metabolism (GABA-T activity nor GABA levels). AOAA, on the other hand, inhibited GABA-T and raised GABA levels significantly. The results of this study rule out the possibility that soman seizure activity is due to a change in the activity of GAD or GABA-T. The study does not rule out the possibility that soman causes convulsions by a non-cholinergic mechanism, and indicates that an alteration of GABA metabolism leads to the abolition of organophosphate induced convulsions. Soman induced convulsions appear to be blocked by compounds which exert their effects via alterations in gamma aminobutyric acid metabolism. (Author abstract by permission)

79-0356. Cecil, H. C.; Harris, S. J.; Bitman, J. (Anim. Physiol. & Genet. Inst., ARS, USDA, Beltsville, MD 20705) **Liver mixed function oxidases in chickens: induction by polychlorinated biphenyls and lack of induction by DDT.** *Arch. Environ. Contam. Toxicol.* 7(3): 283-290; 1978. (39 references)

Microsomal hydroxylase and demethylase activities were compared in livers from White Leghorn cockerels fed polychlorinated biphenyls (PCB's) containing 21 to 68% chlorine, or *p,p'*-DDT. The higher chlorinated PCB's, Aroclor 1254 and 1268, were potent inducers of hepatic enzyme activity while DDT did not induce these enzymes. Arochlor 1254 was the most potent inducer because feeding 5 ppm increased liver aminopyrine demethylase activity 1.5x but did not affect liver weight. Feeding 50 and 500 ppm of Aroclor 1254 and 1268 increased liver weight and demethylase activity per mg of protein. A differential response in the two enzymes occurred. Only 500 ppm of Aroclor 1268 increased

hydroxylase activity. Aroclor 1242 had no effect on liver enzyme concentration but 50 and 500 ppm of Aroclor 1242 increased liver weights and consequently increased total enzyme activity. Our data demonstrated that in the avian species DDT and PCB did not have the same effect on hepatic microsomal enzyme activity. (Author abstract by permission)

79-0357. Verma, S. R.; Bansal, S. K.; Dalela, R. C. (Zool. Dep., DAV Coll., Muzaffarnagar 251001, India) **Toxicity of selected organic pesticides to a fresh water teleost fish, *Saccobranchus fossilis* and its application in controlling water pollution.** *Arch. Environ. Contam. Toxicol.* 7(3): 317-323; 1978. (13 references)

Bioassay studies have been conducted with chlordane (an organochlorine compound), and Ekatin (thiometon), Ekalaux (quinalphos), and Sumithion (fenitrothion), (organophosphorous compounds) to determine the LC50, acute toxicities, relative toxicities, presumable harmless concentrations, and dilution volumes for a period of 24, 48, 72, and 96 hr to a fresh water teleost *Saccobranchus fossilis.* The 24, 48, 72, and 96 hr LC50 for chlordane, Ekalaux, Ekatin, and Sumithion are 0.54, 0.49, 0.46, and 0.42 mg/l; 2.75, 2.40, 1.75, and 1.55 mg/l; 12.40, 12.10, 11.75, and 11.00 mg/l; and 14.90, 14.20, 13.75, and 12.50 mg/l, respectively. Presumable harmless concentrations are 0.12, 0.55, 3.46, and 3.87 mg/l, respectively, which are a fraction of LC50 values. The relative toxicities of these pesticides calculated on the basis of 24 hr LC50 to the fish are 27.59, 5.42, 1.20, and 1.00 for chlordane, Ekalaux, Ekatin, and Sumithion, respectively. The acute toxicity for Sumithion to the test fish lies between 12.10 and 18.75 mg/l, for chlordane between 0.37 and 0.75 mg/l, for Ekatin between 10.00 and 14.20 mg/l, and for Ekalaux between 1.35 and 3.25 mg/l. It is concluded from the study that chlordane is the most toxic and Sumithion is the least toxic while the toxicities of Ekatin and Ekalaux lie between the two. When the data for survival of the test fish vs. log concentration are plotted, they exhibit a linear relationship following the formula $Y = Y + b(X - X)$. The presumable harmless concentrations can be utilized on broad lines for controlling short-term water pollution by these pesticides. (Author abstract by permission)

79-0358. Davison, K. L. (Metab. & Radiat. Res. Lab., Agric. Res. Serv., USDA, Fargo, ND 58102) **Calcium-45 uptake by shell gland, oviduct, plasma and eggshell of DDT-dosed ducks and chickens.** *Arch. Environ. Contam. Toxicol.* 7(3): 359-367; 1978. (15 references)

Experiments were conducted with ducks and chickens to determine the effects of acute doses of DDT and DDE on calcium-45 balance and calcium-45 distribution among plasma, femur, tibia, oviduct, shell gland, and eggshell. Species differences in distribution of calcium-45 were evident between control ducks and control chickens. Ducks contained more radiocalcium in plasma, shell glands, tibias, and femurs than chickens and elimniated less radiocalcium in their droppings than chickens. The percentage of radiocalcium deposited in eggshells by control birds of either species was about equal. Ducks and chickens treated with DDT or DDE contained more radiocalcium in their shell glands than their respective controls. Treament with DDT or DDE caused eggshell thinning in ducks but not in chickens; however, treatment with DDT or DDE did not alter significantly the percentage of radiocalcium that appeared in eggshells of either species. (Author abstract by permission)

79-0359. Davison, K. L.; Sell, J. L. (Metab. & Radiat. Res. Lab., ARS, USDA, Fargo, ND 58102) **Dieldrin-^{14}C elimination from chickens.** *Arch. Environ. Contam. Toxicol.* 7(3): 369-377; 1978. (10 references)

A series of experiments was conducted with chickens contaminated with ^{14}C-dieldrin to find ways of accelerating the elimination of dieldrin from their bodies. The results of these experiments indicated that charcoal, imbiber beads, and the anion exchange resins, Dowex XFS-4022 and Dowex SBR-C1, would not be useful agents for increasing the amount of dieldrin eliminated via feces (droppings) of chickens. Further imbiber beads coalesced in the gizzard of the chickens and reduced their appetities. The anion exchange resin, cholestyramine, might be useful as a gastrointestinal absorbant for increasing dieldrin elimination in chickens because it increased elimination in droppings, but its effect on ^{14}C residues in carcasses was not clear. We elected not to investigate this compound further. Probucol, investigated because it might alter gastrointestinal absorption or blood physiology that would affect dieldrin elimination, did not increase dieldrin elimination. Severe starvation was the only method investigated that clearly was useful for increasing dieldrin elimination because it increased ^{14}C elimination in droppings and reduced ^{14}C residues in carcasses. (Author abstract by permission)

79-0360. Chebotar', N. A.; Grebenik, L. A.; Kirilenko, A. I. (Dep. Embryol. Inst. Exp. Med., USSR Acad. Med. Sci., Leningrad, USSR) **Vliyanie strassa (immobilizatsii) na embriotoksicheskoe i teratogennoe deistvie 2,4,5-trikhlorfenosiuksusnoi kisloty i ee proizvodnykh. [Effect of stress (immobilization) on embryotoxic and teratogenic action of 2,4,5-trichlorophenoxyacetic acid and its derivatives.]** *Arkh. Anat. Gistol. Embriol.* 75(8): 30-36; 1978. (12 references) (Russian)

The effect of 2-hr immobilization stress on the embryotoxic and teratogenic action of 2,4,5-T (400 mg/kg), 2,4,5-T butyl ester (50-200 mg/kg) and purified butyl ester of 2,4,5-T (800 mg/kg) was studied in pregnant rats. These doses were administered intragastrically between the 9th and 14th days of pregnancy. The animals were immobilized after poisoning. The control animals were treated with the pesticides without immobilization, or were immobilized only. The results were evaluated on the 20th day of pregnancy. The embryotoxic effect was assessed from the numbers of live and dead fetuses. In rats treated with 2,4,5-T on the 9th and 10th days of pregnancy, immobilization increased the post implantation mortality to 52.7% and 33.64%, respectively, versus 5.3-17% in the controls. In rats treated with 2,4,5-T butyl

on the 10th day, immobilization increased the post implantation mortality to 55.66%. In rats treated with purified 2,4,5-T butyl ester, immobilization increased the incidence of malformations induced by 2,4,5-T given on the 9th, 10th and 11th days, and by 2,4,5-T butyl ester given on the 13th and 14th days. Purified 2,4,5-T butyl ester had, however, only mild teratogenic effect, which suggests that the teratogenic effect may be due to an impurity in technical 2,4,5-T. The malformations seen were cleft palate, hydronephrosis, hydrocephalus, and eventration. The findings indicate exposure of the pregnant rats to stress intensifies the teratogenic and embryotoxic action of 2,4,5-T and its derivatives.

79-0361. Chopra, N. M.; Mahfouz, A. M. (Tob. & Pestic. Res. Lab., North Carolina Agric. & Tech. State Univ., Greensboro, NC) **Further investigations into the metabolism of endosulfan I, endosulfan II and endosulfan sulfate in tobacco leaf.** *Beitr. Tabakforsch.* 9(3): 176-179; 1977. (9 references)

A comparison between endosulfan I and II, and endosulfan sulfate pesticide levels in tobacco leaves at harvest time and during curing was made. Experimental plants were separately treated with 0.27 kg/acre and 0.68 kg/acre of endosulfan I, endosulfan II and endosulfan sulfate. Plants were harvested 5, 14, and 24 days after treatment and commercially cured. Pesticides and their metabolites were identified by chromatography and retention times; mass spectra were compared with pure reference compounds. Residue levels of all three pesticides decreased radically from the 5th day through the 24th day in both treatment regimes. Plants treated with 1.50 kg/acre pesticide had higher amounts of residues in the green leaves; however a proportionately greater amount of residue was lost during the curing process, mainly due to volatilization. In green leaves endosulfan sulfate was metabolized into endosulfan I, while during curing the sulfate residue was converted to endosulfan II. It is assumed that the conversion of the sulfate in the intact leaf into endosulfan I is governed by an enzyme which is lost during the curing process.

79-0362. Aldridge, W. N.; Clothier, B.; Forshaw, P.; Johnson, M. K.; Parker, V. H.; Price, R. J.; Skilleter, D. N.; Verschoyle, R. D.; Stevens, C. (Toxicol. Univ., Med. Res. Counc. Lab., Carshalton, Surrey, England) **The effect of DDT and the pyrethroids Cismethrin and Decamethrin on acetylcholine and cyclic nucleotide content of rat brain.** *Biochem. Pharmacol.* 27(12): 1703-1706; 1978. (17 references)

The effects of DDT and the pyrethroids Decamethrin and Cismethrin on acetylcholine (ACh) and on cyclic nucleotides (cAMP, cGMP) content in the rat brain were examined. Oral doses of 180 mg/kg DDT, 100 mg/kg Cismethrin, and 50 mg/kg of Decamethrin dissolved in arachis oil were given to rats starved for 16 hr. and to eel-fed animals. All three pesticides produced marked increases in the levels of cGMP, but not in cAMP of the brain. The largest increase in cGMP levels occurred in the cerebellum, where a 5-10-fold increase was observed, compared with a 2-fold increase in the rest of the brain. Associated with elevated levels of the guanine nucleotide were convulsive symptoms. Levels of ACh in the brains of rats receiving pesticides dropped insignificantly compared with animals receiving arachis oil alone. However, the difference between the experimental group and animals receiving arachis oil alone was that the pesticides produced a more pronounced effect of ACh levels. Two hr after dosing, ACh content of the brain was 13.5 nmol/g compared with 28.4 nmol/g in normal undosed rats.

79-0363. Larsson, B.; Oskarsson, A.; Tjalve, H. (Dep. Toxicol., Univ. Uppsala, Uppsala, Sweden) **On the binding of the bis quaternary ammonium compound paraquat to melanin and cartilage** *in vivo*. *Biochem. Pharmacol.* 27(13): 1721-1724; 1978. (24 references)

The bisquaternary ammonium compound paraquat has been shown to accumulate in melanin-containing tissues and in cartilage *in vivo*. The present study was intended to elucidate if ionic binding is involved in the mechanism for the affinity of paraquat to melanin *in vitro* and in the binding of other bisquaternary ammonium compounds to cartilage *in vitro*. ^{14}C-paraquat was given to mice. Whole-body tissue sections were taken and incubated in solutions with different cationic composition. The ability of the cations to displace ^{14}C-paraquat from melanin of the eye and intervertebral cartilages was then determined by autoradiography, using densitometric measurements for the quantitations. It was found that the cations in the incubation solutions were able to displace ^{14}C-paraquat from both melanin and cartilage. The binding sites may be carboxyl groups present in the subunits in melanin and ester sulphate and carboxyl groups of chondroitin sulphate in cartilage. The stronger binding of paraquat to melanin may depend on extra interactions due to conjunctions of the aromatic rings of the paraquat and the melanin polymer. (Author abstract by permission)

79-0364. Reineke, W.; Knackmus, H. J. (Inst. Mikrobiol., Univ. Gottingen, D-3400 Gottingen, BRD) **Chemical structure and biodegradability of halogenated aromatic compounds. Substituent effects on 1,2-dioxygenation of benzoic acid.** *Biochim. Biophys. Acta* 542(3): 412-423; 1978. (50 references)

Dioxygenation of substituted benzoic acids, some pesticides and their degradation products by whole cells of 3-chlorobenzoate-utilizing *Pseudomonas* sp. B 13, benzoate-induced cells of *Alcaligenes eutrophus* B 9 and toluate-grown cells of *Pseudomonas putida* mt-2 was examined. Electron-attracting substituents like halogen decreased the reaction rates of benzoate 1,2-dioxygenation. Dioxygenation of substituted benzoic acids by *P. putida* mt-2 was mostly undisturbed by steric effects of the substituents. Good correlation resulted between the log V*rel* values and the Hammett substituent constant. In contrast the reaction rates of dioxygenation by *Pseudomonas* sp. B 13 and *A. eutrophus* were decreased predominantly by steric effects of substitutents. A non-polar reaction mechanism of benzoate 1,2-dioxygenation is discussed. Results from inhibition studies demonstrate high stereospecificities for the 1,2-dioxygenation by *Pseudomonas*

sp. B 13 of benzoic acids with substituents in ortho- or para-position. In the case of *P. putida* mt-2 steric hindrance by substituents was observed only with ortho-substituted benzoic acids. Stereospecificities of the benzoate 1,2-dioxygenation by *Pseudomonas* sp. B 13 and *P. putida* mt-2 are illustrated schematically. (Author abstract by permission)

79-0365. Kalinowska, Z. E.; Zasadowski, A. (Dep. Toxicol., Inst. Basic Vet. Sci., Sci. Tech. Acad., Olsztyn, Poland) **Toksycznosc ostra Dermafosu (fenchlorfosu) koncentratu czystego i technicznego dla kur i krolikow w ocenie sredniej dawki smiertelnej (DL50). [Acute toxicity of pure and technical Dermaphos (fenchlorphos) to chickens and rabbits.]** *Bromatol. Chem. Toksykol.* 10(4): 339-344,; 1977. (13 references) (Polish)

The acute oral LD50 of pure (98.5%) fenchlorfos was 6735 mg/kg in hens and 462 mg/kg in rabbits. The acute oral LD50 of the technical preparation (86.5%) was 3148 mg/kg in hens and 272 mg/kg in rabbits. Macroscopic and microscopic examination of the internal organs of poisoned animals indicated that the toxic effects of fenchlorophos were exerted primarily on the liver and kidney. The animals which survived showed reduced weight gains. In hens given pure and technical preparations the weight gains were reduced by 15.3% and 19.8%, respectively compared to controls, and in rabbits by 16.5% and 25.8%, respectively. The greater toxicity of fenchlorophos in rabbits than in hens was attributed to differences in the anatomy and physiology of the alimentary tract in these two species. Impurities in the technical concentrate increase the toxicity of the preparation.

79-0366. Strobel-Kaminska, T. (Dep. Hum. Physiol., Inst. Pathol., Clin. Acad. Med., Lublin, Poland.) **Zmiany aktywnosci oddechowej miesnia sercowego pod wplywem chlorfenwinfosu w badaniach *in vitro* i *in vivo*. [*In vitro* and *in vivo* effects of chlorfenvinphos on respiratory activity of cardiac muscle.]** *Bromatol. Chem. Toksykol.* 10(4): 345-350; 1977. (16 references) (Polish)

The oxygen consumption by cardiac muscle sections, meausred by the Warburg manometric method, was altered by administration of chlorfenvinphos. Low doses of chlorfenvinphos increased the oxygen consumption, whereas high doses depressed cellular respiration. In addition, the oxygen consumption varied in accordance with the method of administration of test substance. In *in vitro* studies, the lowest dose of chlorfenvinphos (0.01 LD50) caused a marked rise of oxygen consumption, whereas following chronic *in vivo* administration of chlorfenvinphos at minimal doses, only a slight increase in oxygen consumption was observed (not statistically significant). Chlorfenvinphos, tested *in vitro* at higher doses, slightly decreased the cellular respiration in the myocardium. A distinct inhibitory effect of higher insecticide doses was seen in *in vivo* experiments.

79-0367. Skalska, E.; Obrusiewicz, K.; Sulinski, A. (Dep. Drug Metab., Inst. Biopharm., Acad. Med., Warsaw, Poland) **Wplyw fenchlorfosu na aktywnosc niektorych esteraz osocza krwi szczura. [Effect of fenchlorfos in the activity of some blood serum esterases in rat.]** *Bromatol. Chem. Toksykol.* 10(4): 351-356; 1977. (16 references) (Polish)

Serum cholinesterase, alkaline phosphatase, and acid phosphatase activities was examined in rats intoxicated with fenchlorfos at different dosages. Changes in cholinesterase activity following a single dose of fenchlorfos were also examined. After high doses of fenchlorfos a considerable decrease of the cholinesterase activity, lasting 24 hr, and reflecting toxic activity of the pesticide or its metabolites was noted. Changes in the activities of the enzymes investigated in acute and chronic (14-day) administration of fenchlorfos depended on the insecticide dose and the time elapsed after administration. Results of adaptation experiments suggest the existence of some adaptation mechanisms to organophosphates.

79-0368. Zalewska, Z.; Jurkiewicz, G.; Wenzel, E. (Dep. Drug Metab., Inst. Biopharm., Acad. Med., Warsaw, Poland) **Fosforylacja oksydacyjna i akywnosc dehydrogenazy glukozo-6-fosforanowej mozgu szczura w nastepstwie zatrucia trichlorfonem i dichlorfosem. [Oxidative phosphorylation and brain glucose-6-phosphate dehydrogenase activity in rats intoxicated with trichlorfon and dichlorvos.]** *Bromatol. Chem. Toksykol.* 10(4): 357-365; 1977. (18 references) (Polish)

Rats were intoxicated with single or repeated doses of trichlorfon or dichlorvos and measurements of glucose-6-phosphate dehydrogenase (6-GPD) activity and oxidative phosphorylation were conducted in the brains of these rats. The 6-GPD activity in the brain hemispheres was studied spectrophotometrically, and respiration in the presence of a succinate as well as oxidative phosphorylation in rat brain mitochondrial fractions were tested by polorography with Clark's oxygen electrode. Single and repeated doses of trichlorfon and dichlorvos increased the 6-GPD activity in the brain. No effects of the test insecticides on oxidative phosphorylation were found. These results differ from those observed for thioorganophosphorus insecticides.

79-0369. Czeczuga, B.; Gierasimow, M. (Dep. Gen. Biol., Inst. Biostrukt., Acad. Med., Bialystok, Poland) **Wplyw DDT na zawartosc aminokwasow w hodowlach zielenie jednokomorkowych. [Effect of DDT on amino acids content in cultures of unicellular algae.]** *Bromatol. Chem. Toksykol.* 10(4): 331-337; 1977. (16 references) (Polish)

Effects of DDT at several concentrations in the growth medium on the content of specific amino acids in some unicellular algae were investigated by two-dimensional ascending paper chromatography. DDT at levels of 1-25 mg/l inhibited the growth of the algae tested. In the case of *Chlamydomonas nivalis*, when DDT was present in the medium at 1-5 mg/l most of the amino acids investigated decreased. Tyrosine increased slightly. In the concentration range of 10-25 mg/l all amino acids decreased (especially alanine, aspartic acid and threonine), except for tyrosine, which remained constant. In the case of *Ankistrodesmus fal-*

catus at DDT levels of 1-5 mg/l most of the amino acids had a tendency to decrease; methionine and valine levels remained approximately equivalent to those in controls, and leucine and isoleucine even increased slightly. A significant decrease in levels of all amino acids tested except for aspartic acid was observed at 10-25 mg/l. When DDT was present at 1-5 mg/l in the growth medium all tested amino acid levels declined except for histidine, which increased slightly. Only an increase in arginine and serine levels was noted at a DDT level within the medium in the concentration range of 10-25 mg/l; histidine remained equal to controls, and the other amino acids decreased. Proline in particular was reduced to trace levels.

79-0370. Somers, J. D.; Moran, E. T., Jr.; Reinhart, B. S. (Dep. Anim. & Poult. Sci., Univ. Guelph, Guelph, Ont., Canada) **Hatching success and early performance of chicks from eggs sprayed with 2,4-D, 2,4,5-T and picloram at various stages of embryonic development.** *Bull. Environ. Contam. Toxicol.* 20(3): 289-293; 1978. (7 references)

Aqueous solutions of 2,4-D, 2,4,5-T and picloram were sprayed on hens eggs at the start of, and 4 and 18 days after the onset of embryonic development. Concentrations of pesticides exceeded 10 times the normal rate of application (11.2 kg/ha). No significant adverse effects in either eggs or in hatchlings could be attributed to any of the pesticides. Percentages of malformations in developing eggs were 1.0% for picloram, 1.3% for 2,4,5-T, and 1.6% for 2,4-D. Of the chicks whose eggs were treated with picloram, 7.3% died. Mortality due to 2,4,5-T and 2,4-D spraying was 7.8 and 2.5%, respectively. The use of blank spray resulted in a 3.9% loss of eggs. Although extended preincubation storage (up to 24 days) significantly reduced hatching success, it was independent of herbicide contact or stage of application.

79-0371. Werner, D.; Morschel, E. (Fachbereich Biol., Univ. Marburg-L, Lahnberge, Marburg, BRD) **Preferential elimination of dieldrin by some diatoms compared to *Chlamydomonas* and *Scenedesmus* species.** *Bull. Environm. Contam. Toxicol.* 20(3): 313-319; 1978. (13 references)

Four species of diatoms (*Cyclotella* and *Nitzschia* sp) were compared with ten algal species of *Chlamydomonas* and *Scenedesmus* for dieldrin adsorption capacities. Radioactivity labeled ^{14}C-dieldrin (0.135 g/ml) was added to algal cultures and incubated 1-27 hr. *Nitzschia* strain 16 and *Cyclotella cryptica* adsorbed 85-90% of the dieldrin within 1 hr. Dead cells of *Cyclotella* adsorbed only slightly less dieldrin than did living cells, indicating that cell viability was not a prerequisite for adsorption. The algal species were less effective than the diatoms; *Scanedesmus* sp adsorbed only 35% dieldrin after 1 hr. Each of 5 species of *Chlamydomonas* eliminated less than 40% of the pesticide within 5 hr, and only 60% after 27 hr. The results suggest that diatoms are better adsorbers of pesticides than are algal species of *Chlamydomonas* and *Scenedesmus*.

79-0372. Wiltrout, R. W.; Ercegovich, C. D.; Ceglowski, W. S. (Dep. Microbiol., Pennsylvania State Univ., University Park, PA) **Humoral immunity in mice following oral administration of selected pesticides.** *Bull. Environ. Contam. Toxicol.* 20(3): 423-431; 1978. (16 references)

The time of pesticide exposure, relative to immunization and subsequent immune response, and dosage effects of various pesticides on the primary immune response of animals were examined. Female Balb/c mice were administered 0.5 ml oral doses of DDT, parathion, ametryne, carbaryl, and chlordimeform. For the studies of the effects of various pesticides on humoral immune competence, doses were administered 5 days before, on the day of, and two days after immunization. Some animals were also fed daily doses of pesticides for 8 and 28 days before immunization. All five pesticides induced significant suppression of the humoral immune response in near lethal doses (1 LD50). Ametryne and chlordimeform administered before immunization in these quantities also suppressed humoral immune competence. Administration of 0.1 LD_{50} parathion/day for 8 days resulted in significant suppression of the humoral immune response.

79-0373. Kokshareva, N. V.; Kovtun, S. D.; Kagan, Yu. S.; Mizyukova, I. G.; Medvedev, B. M. (Lab. Gen. Toxicol., All-Union Sci. Res. Inst. Hyg. & Toxicol. Pestic., Polymers, & Plastics, Kiev, USSR) **Action of diethixime, a new cholinesterase reactivator, on the central nervous system.** *Bull. Exp. Biol. Med. USSR* 83(1): 32-35; 1977. (15 references)

English translation; for abstract of original Russian article see Abstract No. 79-0374.

79-0374. Kokshareva, N. V.; Kovtun, S. D.; Kagan, Yu. S.; Mizyukova, I. G.; Medvedev, B. M. (Lab. Gen. Toxicol., All-Union Sci. Res. Inst. Hyg. & Toxicol. Pestic., Polymers & Plastics, Kiev, USSR) **Deistvie novogo reaktivatora kholinesterazy dietiksima na tsentral' nuyu nervnuyu sistemu. [Action of diethixime, a new cholinesterase reactivator, on the central nervous system.]** *Byull. Eksp. Biol. Med.* 83(1): 29-32; 1977. (15 references)

The action of diethixime and dipyroxime in rabbits and albino rats poisoned with dimethyldichlorovinyl phosphate (DDVP, dichlorvos) was investigated. The animals were given DDVP orally in a dose of LD50 (10 mg/kg for rabbits, 40 mg/kg for rats). Twenty mg/kg of diethixime or 3 mg/kg of dipyroxime was injected im 1-2 min after the poison. Acute poisoning typical of organophosphorus insecticides became apparent during the first 15-20 min after DDVP administration. Treatment with diethixime reduced the severity of the poisoning symptoms and largely restored acetylcholinesterase activity in the central nervous system, which had been 65-73% inhibited by the DDVP. In response to preliminary stimulation of the dorsal root, an MSP was recorded from the ventral root in anaesthetized rats. MSP was absent for an initial period of approximately 1 msec. This was followed by a phase of reinforcement of the test MSP, which was 4-5 msec long in control rats. The maximum degree of reinforcement, calculated as the ratio between the test MSP

and the preliminary potential, was 300% in control rats. Following this phase, the degree of reinforcement decreased to as low as about 50% until at least 120 msec. When rats were poisoned with DDVP, the maximum degree of reinforcement increased to over 400%, and reinforcement continued for 15-17 msec. When DDVP and diethixime were given, the maximum degree of reinforcement was slightly less than 300% and was reached later than in control rats. When DDVP and dipyroxime were given, the maximum degree of reinforcement was 550%, and reinforcement continued for approximately 15 msec. The degree of reinforcement eventually dropped to less than 100% for all groups, and after about 30 msec was less than 50% for rats given DDVP and dipyroxime. Diethixime normalized the EEG after poisoning with DDVP; dipyroxime did not.

79-0375. Konyukhov, A. F. (Author address not given) **Biokhimicheskie izmeneniya v organizme kur pri otravelenii amifosom. [Biochemical changes induced by amiphos poisoning in hens.]** *Byull. Vses. In-ta, Eksperm. Vet.* (27): 13-16; 1976. (Russian)

The biochemical changes induced by single oral amiphos (DAEP) doses of 45 mg/kg (LD100) and 15 mg/kg (LD0) were studied in 20 hens. Five other untreated hens served as controls. Following the administration of the higher dose, the symptoms of poisoning appeared after 1.5-2 hr, and were most pronounced after 7.8 hr. They included reduced muscular tonus, tremor, salivation, spasms, coma and asphyxia. The acetyl cholinesterase activity dropped by 40%, the thyamine level by 56.5%, the pyruvic acid level rose by 17%, and the adenosine triphosphatase (ATPase) activity was normal. The amiphos residues found were 10 mg/kg in the gastric content, 0.5 mg/kg in the kidneys, and 1 mg/kg in the liver. In the other group, the poisoning symptoms appeared after 3-4 hr. They included muscular dyscoordination and general depression. In the animals killed one day after poisoning the acetylcholinesterase activity was reduced by 22%, the thiamine content by 28%, the pyruvic acid level was increased by 43%, and he ATPase activity was normal. The residue levels found were 1.5 mg/kg in the gastric content, 0.5% in the liver, and 0.3 mg/kg in the kidneys. Two days after poisoning the ATPase activity was reduced by 45%. All parameters except the pyruvic acid level were normal 15 days after poisoning. The inhibition of acetyl cholinesterase and ATPase, the reduction of the thiamine level, and the increase in the pyruvic acid level are indicative of disturbances in acetylcholine metabolism, and the depletion of the biological reserves of its resynthesis during the second phase of the poisoning.

79-0376. Percich, J. A.; Lockwood, J. L. (Dep. Bot. & Plant Pathol., Michigan State Univ., East Lansing, MI 48824) **Interaction of atrazine with soil microorganisms: population changes and accumulation.** *Can. J. Microbiol.* 24(10): 1145-1152; 1978. (18 references)

A loam soil treated with atrazine at rates of 10, 30, and 100 μg/g soil resulted in increased populations of actinomycetes, bacteria, and fungi over those in non-treated soil. The increases were in proportion to the amount of atrazine and persisted for at least 2 months. Living actinomycete and fungal mycelia were incubated for 48 hr in distilled water, nutrient broth, or soil containing 5 μg/ml (g) of the herbicide. Actinomycete and fungal mycelia accumulated atrazine from water to concentrations up to 87-fold and 132-fold, respectively, over that in the ambient medium. The maximum accumulation from soil by actinomycete mycelia was 26-fold and by fungal mycelia 13-fold. Fungi accumulated little or no atrazine from a nutrient medium whereas actinomycetes accumulated up to 13-fold. Dead mycelia usually did not accumulate atrazine in excess of the ambient concentration. Mycelium of *Sclerotium rolfsii* growing in a nutrient medium containing 20 μg atrazine/ml accumulated 157 μg/g wet weight after 8 days. Sclerotia subsequently produced, after transfer of similar mats to soil, contained 550 μg/g wet weight. (Author abstract by permission)

79-0377. Lundy, P. M. (Def. Res. Estab. Suffield, Ralston, Alberta, Canada) **The ganglionic blocking properties of the cholinesterase reactivator, HS-6.** *Can. J. Physiol. Pharmacol.* 56(5): 857-862; 1978. (15 references)

Following intravenous administration of the chloinesterase reactivator HS-6 (30 mg/kg), blood pressure fell (up to 50 mmHg) and maximal blood levels of HS-6 reached 242 μg/ml. HS-6 attentuated the pressor response resulting from carotic occulsion and the depressor effect of vagal stimulation. Doses of HS-6 below those used to protect against soman in different animal species (10-30 μmol/kg) progressively blocked the ganglion-stimulating effects of nicotine and dimethylphenyl piperazinium but not the pressor effect following adrenaline, a pattern similar to that produced by hexamethonium but only 0.012 as potent. HS-6, like hexamethonium and mecamylamine, progressively blocked the contraction of the nictitating membrane of the cat resulting from preganglionic stimulation. The results indicate that HS-6 possesses ganglion-blocking properties at doses likely to be used in the protection against soman poisoning. The ganglion-blocking properties of the drug may be a factor in the beneficial effects of HS-6. (Author abstract by permission)

79-0378. Schiller, C. M.; Lucier, G. W. (Lab. Environm. Toxicol., NIEHS, Research Triangle Park, NC 27709) **The differential response of isolated intestinal crypt and tip cells to inductive actions of 2,3,7,8- tetrachlorodibenzo- *p*-dioxin.** *Chem. Biol. Interact.* 22(2-3): 199-209; 1978. (30 references)

Adult female rats were given oral doses of 8 μg/kg of ^{14}C- 2,3,7,8- terachlorodibenzo- *p*-dioxin (TCDD), an extremely toxic byproduct of commercial 2,4,5-T synthesis. TCDD-mediated induction of uridine diphosphate (UDP)-glucuronyl transferase was monitored in the tip and crypt regions of the intestinal epithelial cells of the rats. In both cell types, UDP-glucuronyltransferase and radioactivity were assayed 0, 3, and 10 hr; and 1, 3, and 5 days after

treatment. No change in enzymatic activity was observed until 24 hr after treatment, when crypt cell activity increased 3-fold. Differentiated tip cell enzyme activity was evident 3 days after administration of TCDD. UDP-glucuronyl transferase increased 2-fold in both cell types from 3-5 days following treatment. There was indication that undifferentiated crypt cells are more sensitive to the inductive action of TCDD than are cells of the crypt region.

79-0379. Carere, A.; Ortali, V. A.; Cardamone, G.; Morpurgo, G. (Inst. Super. Sanita. & Ort. Bot., Univ. Roma, Rome, Italy) **Mutagenicity of dichlorvos and other structurally related pesticides in *Salmonella* and *Steptomyces*.** *Chem. Biol. Interact.* 22(2-3): 297-308; 1978. (27 references)

To determine whether the mutagenic properties of dichlorvos are due to the whole molecule or only part of it, dichlorvos and structurally related pesticides were tested on histidine (his) requiring strains of *Salmonella typhimurium* , and on *Streptomyces coelicolor.* Dichlorvos and trichlorphon, which possess dichlorovinyl side groups, were mutagenic in both *Salmonella* and *Steptomyces.* The five organophosphorus pesticides, azinphos methyl, fenchlorphos (ronnel), mevinphos, monocrophotos and methyl parathion are similar to dichlorvos but are devoid of the dichlorovinyl group. None of these five compounds increased spontaneous mutations in either genetic system. Three carbamates, di-allate, triallate and Vegadex (sulfallate), contain chloroallyl groups similar to the vinyl group. All three were weakly mutagenic in *Streptomyces.* Triallate and Vegadex are strong mutagens in *Salmonella.* The carbamates EPTC and noruron (norea) lack chloroallyl groups and were not mutagenic. The presence of vinyl chloride or allyl chloride appeared to be responsible for the induction of point mutations.

79-0380. Ismail, R. M.; Salminen, L.; Korte, F. (Inst. Exp. Ophthalmol., Univ. Bonn, Bonn, BRD) **Distribution of topically applied environmental chemicals in the rabbit eye.** *Chemosphere* 6(12): 797-802; 1978. (9 references)

Solutions of various chemicals which are found in the environment, were dropped (16.7 μl) into eyes of rabbits. The animals were killed 30 or 60 min, after the application of the chemicals and the degree of penetration of each chemical into the eyes was then studied. All the chemicals used penetrated the cornea under the conditions of this study. The chemicals included *p*-chloroaniline, buturon, 2,2′-dichloro biphenyl, 2,4,6-trichlorphenol, aldrin, and pentachlorophenol (PCP). The concentrations of the chemicals were generally higher in the eye tissues after 30 min than they were after 60 min. The chemicals were present in all eye tissues investigated, with the highest amounts being present in the cornea, conjunctive, limbus, and sclera. Each of the chemicals was present also in the lens, though to a much smaller degree. Polyhalogenated compounds penetrated the lens in smaller amounts than did mono chloroaniline. The highest concentration found in the lens was 0.29% in the case of *p*-chloroaniline, and the smallest was 0.011% in the case of pentachlorophenol.

79-0381. Huddart, H. (Dep. Biol. Sci., Univ. Lancaster, Lancaster LA1 4YQ, England) **Parathion- and DDT-induced effects on tension and calcium transport in molluscan visceral muscle.** *Comp. Biochem. Physiol. C.* 61(1): 1-6; 1978. (40 references)

DDT and parathion (100-500 μM) induced small contractures in molluscan columbella muscle, and caused a significant stimulation of the slow component of ^{45}Ca efflux from the whole fibres. Neither insecticide appeared to affect the initial fast efflux component. These insecticides strongly inhibited both active and passive binding of calcium by isolated mitochondria and submembrane vesicles, while they induced a stimulation of calcium efflux from these subcellular fractions under *in vitro* conditions. It is suggested that these insecticides induce contractures in molluscan smooth muscle by mobilization of calcium from both the mitochondrial and submembrane vesicular storge sites. (Author abstract by permission)

79-0382. Curtis, L. R.; Beyers, R. J. (Dep. Pharmacol. & Toxicol., Med. Cent., Univ. Mississippi, Jackson, MS 39216) **Inhibition of oviposition in the teleost *Oryzias latipes*, induced by subacute Kepone exposure.** *Comp. Biochem. Physiol. C* 61(1): 15-16; 1978. (13 references)

The organochlorine pesticide Kepone (chlordecone) has been reported to interfere with avian and mammalian reproduction. Breeding female *Oryzlas latipes* were exposed to 1 and 2 parts per billion (ppb) Kepone in their aquarium water. Ovoposition ceased within 252 hr of treatment in all 1 ppb animals, and within 96 treatment hr at 2 ppb. (Author abstract by permission)

79-0383. Banna, H. B.; Plummer, J. M.* (Dep. Physiol., Royal Vet. Coll., London NW1 0TU, England) **The effects of Frescon on molluscan hearts.** *Comp. Biochem. Physiol. C* 61(1): 33-36; 1978. (8 references)

Low concentrations of Frescon (*N*-trityl morpholine) cause a slowing of heart rate in intact *Bulinus.* In the isolated heart of *Archachatina* Frescon causes a contracture that ultimately cannot be opposed by the excitatory effects of 5-HT. It is postulated that Frescon affects the calcium and ATP cycling mechanisms of the cardiac fibres. (Author abstract by permission)

79-0384. Robinson, K. D. (Mississippi State Univ., Jackson, MS) **A study of *in vivo* effects of mirex on liver metabolism in rats, with emphasis on liver enlargement.** *Diss. Abstr. Int. B* 39(3): 1150; 1978.

A single oral dose of 50, 100, or 150 ppm mirex causes rapid liver enlargement in rats (up to 100% increase in liver weight within four days from 100 or 150 ppm). The liver weight increase is dose dependent in magnitude but dose independent in rat. If no further mirex is administered, the liver returns to normal size within one month. The mirex concentration in the liver is most closely correlated with the quantity of lipid present in the liver which is in excess of

normal. Glycogen stores are not depleted during liver enlargement. Liver glutamate oxalacetate transaminase (GOT) and glutamate pyruvate transaminase (GPT) activity changes in direct opposition to changes in liver weight. Liver function tests do not indicate that liver enlargement is compensation for hypofunctional tissue. Serum total lipid and total protein concentration and the serum protein electrophoretic patterns are unchanged in mirex-pretreated rats with enlarged livers. To produce the observed increase in total liver protein liver protein metabolism changes by decreasing the quantity of protein catabolized per unit time rather than increasing the quantity of protein synthesized. The liver response to mirex appears to be an 'adaptive' type response to increased work load. This type of liver enlargement is common in response to many chemicals which do not cause pathological damage to the liver. Of all compounds which have been reported to stimulate liver enlargement, mirex produces the most rapid and dramatic enlargement; therefore, mirex should prove to be an excellent tool for studying the mechanism of liver enlargement. (Author abstract by permission, abridged. Copies of the thesis are available for University Microfilms, order No. 7814870.)

79-0385. Schein, L. G. (West Virginia Univ., Morgantown, WV) **An evaluation of the effects of two pesticides on the male reproductive endocrine system.** *Diss. Abstr. Int. B* 39(3): 1235; 1978.

The present studies investigated the effects of parathion (P), an organophosphate insecticide, and dieldrin (D), an organochlorine insecticide, on various aspects of the male reproductive endocrine system. The administration of P (5.2 mg/kg daily x 10 p.o.) or D (5.0 mg/kg daily x 10 p.o.) to mice caused significant ($P \leq 0.05$) reductions of anterior prostate gland weights. Testes weights and body weights were not altered by P or D treatment. Various *in vitro* concentrations (10-10,000 n*M*) of P, D or paraoxon, a major metabolite of parathion, failed to affect the bioconversion of ^{3}H-T to its metabolites by the prostate gland. Although the pesticides had no effect on prostatic metabolism of androgens, subsequent experiments revealed that P (10 & 10-μM) but neither D nor paraoxon, significantly ($P \leq 0.05$) inhibited the *in vitro* specific binding of ^{3}H-DHT in cytosol prepared from mouse prostates, seminal vesicles, kidneys or livers. Further investigations revealed that P was a competitive inhibitor of specific ^{3}H-DHT binding to cytosolic androgen receptors. High concentration (1-10 μM) of P or D *in vitro* significantly inhibited the formation of hydroxylated radiosteroids from ^{3}H-T by mouse hepatic microsomes. However, pretreatment of mice with D (1.25, 2.50 cm, 5.00 mg/kg daily c 10 p.o.) caused significant increases in 7α-hydroxylase activity of hepatic microsomes. Similar doses of D also caused significant increases in mouse liver weights, hepatic microsomal cytochrome P 450 content. The results of the present studies have revealed that mouse anterior prostate gland weight reduction caused by P treatment can be due to the ability of this organophosphate to interfere with DHT-receptor interactions in the cytosol of this organ. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 7816987.)

79-0386. Sonnet, P. E.; Lye, T. L.; Sackett, R. R. (Honey Bee Pestic. Dis. Res., Agric. Res. Serv., USDA, Laramine, WY 82071) **Effects of selected herbicides on the toxicity of several insecticides to honey bees.** *Environ. Entomol.* 7(2): 254-256; 1978. (8 references)

An investigation of the potential hazards of coexposure to herbicides and insecticides was carried out on honeybees. Insecticides representing the two major classes that constitute a danger to the honeybee, the carbamates and organophosphates, were fed to honeybees alone and in combination with a herbicide. The results showed no significant increase in the toxicity of the insecticide due to added herbicide. For example, diazinon at a concentration of 5 ppm produced 27 $\pm$ 9.0% mortality alone, and 32 $\pm$ 8.6% mortality in combination with the herbicide atrazine. In fact, atrazine appeared to have a mild therapeutic effect when administered with parathion: parathion (10 ppm) given alone produced 33 $\pm$ 9.4% mortality, while in combination with atrazine the mortality was 12 $\pm$ 6.4%.

79-0387. Dikshith, T. S. S.; Tandon, S. K.; Datta, K. K.; Gupta, P. K.; Behari, J. R. (Ind. Toxicol. Res. Cent., Lucknow, India) **Comparative response of male rats to parathion and lindane: histopathological and biochemical studies.** *Environ. Res.* 17(1): 1-9; 1978. (24 references)

Exposure of male rats to parathion (2.6 mg/kg), lindane (17.6 mg/kg), or their combination through oral intubation daily for a period of 90 days produced histological and biochemical alterations in the liver and testis. The focal necrosis of the liver, although observed in all the treatments, was very prominent in the animals exposed to lindane alone. The kidney and epididymis, however, did not show any significant histological lesions. The activity of acetylcholine esterase in blood and brain decreased markedely, whereas that of succinic dehydrogenase, adenosine triphosphates, and the alkaline and acid phosphatases in liver and testis showed significant alterations for all three treatments. (Author abstract by permission of Academic Press).

79-0388. Kenega, E. E. (Health & Environ. Res., Dow Chem., USA, Midland, MI 48640) **Test organisms and methods useful for early assessment of acute toxicity of chemicals.** *Environ. Sci. Technol.* 12(12): 1322-1329; 1978. (25 references)

Acute toxicity data for 8 organisms commonly used for evaluation of environmental hazards of chemicals were collected and tabulated for 75 insecticides and herbicides. Correlations concerning the usefulness of each species as a selective, sensitive indicator to a wide spectrum of animal organisms were developed in order to provide a basis for selection of toxicity screening tests for use on thousands of industrial chemicals. The objective is to gain a maximum amount of information from a mimimum amount of data based on science, and to know the degree of certainty associated with extrapolation of toxicity data from one species to another. On the basis of these correlations, three organisms were found to be the best indicators of acute toxicity to a wide

variety of species. These organisms, the rat, one species of fish, and daphnia, are useful for the first round of acute toxicity testing when use and properties of the chemical result in significant environmental exposure. (Author abstract reprinted by permission of the American Chemical Society).

79-0389. Miyata, M.; Imai, H.; Ishikawa, S. (Author address not given) **Experimental retinal pigmentary degeneration by organophosphorus pesticide in rats.** *Excerpta Med. Int. Congr. Ser.* 442: 50; 1978.

Fenthion, an organophosphorus pesticide, was given i.m. to pigmented Long Evans and albino Wistar rats for a period of 1 yr, with each rat receiving a total dose of 1.0 to 1.8 g. At 3-6 mo after the start of the experiment, electro retinography amplitudes were diminished, particularly so in the *a* and *b* waves. At 9 mo, they disappeared. At 1 yr an obvious fundus was observed in both strains of rat which simulated retinal pigmentary degeneration in humans. Severe histopathological changes were noted in the pigment epithelium as well as in the visual cells. Atrophy was noted in the choroidal vessel, especially in the capillary bed. The findings of these studies support the thesis that chronic administration of an organophosphate pesticide can product retinal pigmentary degeneration in rats. [At the 23rd International Congress of Ophthalmology.]

79-0390. Chandra, D. B.; Agrawal, T. N. (Author address not given) **Optic neuropathy due to environmental exposure to organophosphate pesticides: an experimental study.** *Excerpta Med. Int. Cong. Ser.* 442: 50; 1978.

Effects of organophosphate pesticides on the eyes, such as myopic astigmatisms, abnormal pigmentation and abnormalities of the optic nerve are outlined. Albino rabbits were exposed to parathion to study the histological changes in the eye. In 70% of the animals exposed, optic neuropathy was noted and linked to organophosphate exposure. [At the 23rd International Congress of Ophthalmology.]

79-0391. Uga, S.; Hirosawa, H.; Miyata, M.; Ishikawa, S. (Author address not given) **Retinal degeneration in Long-Evans rats induced by fenthion intoxication: an electron microscopic study.** *Excerpta Med. Int. Congr. Ser.* 442: 52; 1978.

Fenthion, an organophosphate insecticide, was given by s.c. injection at 50 mg/kg to Long-Evans rats for as long as a 1 yr period, with injections being given every 4th day. Retinal degeneration was induced; the most characteristic features being complete loss of photoreceptor cells, focal or massive disruption of pigment granules in the pigment epithelium, and narrowing of retinal blood vessels. These findings are similar to conditions observed in humans exposed to organophosphates for periods of time. [At the 23th International Congress of Ophthalmology.]

79-0392. Karel, A. K. (Toxicol. Lab., Dep. Zool., Univ. Rajasthan, Jaipur, India) **The effect of pyrethrum on the serum alkaline phosphatase activity of the Indian desert gerbil, *Meriones hurrianae* Jerdon.** *Folia Biologica (Krakow)* 24(1): 9-13; 1978. (17 references)

The effects of the insecticide pyrethrum on serum alkaline phosphatase activity were studied. Male gerbils were injected with various doses of pyrethrum: 60 mg/kg body wt; 120 mg/kg body wt; and 180 mg/kg body wt. The animals were killed 1, 2, 3, 7, 14, 21, and 28 days after treatment, blood was obtained from the hearts, and the serum alkaline phosphatase activity was determined. The results showed that the serum alkaline phosphatase activity was enhanced in treated animals compared with controls, but within 4 wk the levels in treated and control animals were essentially the same. The increase in activity was more pronounced in animals receiving higher doses. Further research would have to be carried out to determine whether the increase in serum alkaline phosphatase activity was due to damage to the liver parenchyma cells, or to hepatic microsomal enzyme induction.

79-0393. Grunow, W.; Altmann, H. J.; Bohme, C. (Bundesgesundheitsamt, Max Pettenkofor Inst., D-1000 Berlin 33, BRD) **Metabolisierung von Buturon in der Ratte. [Metabolism of buturon in the rat.]** *Food Cosmet. Toxicol.* 16(4): 349-353; 1978. (5 references) (German)

The metabolism of buturon has been studied in the rat following administration of a single oral dose of 200 mg/kg body weight. After enzymatic hydrolysis, 13 metabolites were separated from the urine by preparative thin-layer chromatography and identified by mass spectrometry. Small amounts of free *p*-chloraniline were detected by steam distillation followed by a color reaction. No unchanged buturon was found in the urine. Most of the metabolites retained the original urea structure. They were formed by hydroxylation at the *o*- or *m*- position and by removal of the methyl or isobutinyl group. Hydrolysis of the urea group with formation of *p*- chloroaniline and the corresponding aminochlorophenols occurred only to a minor extent. The main excretion products were *p*-chloro-, *p*-chloro-*o*- hydroxy- and *p*-chloro-*m*-hydroxy phenulurea. After administration of an identical dose of ^{14}C-labeled buturon, 68% of the radioactivity was excreted in the urine and 20% in the feces within 4 days. (Author abstract by permission)

79-0394. Aleksandrova, L. G.; Klisenko, M. A. (Kiev Sci. Res. Inst. Ind. Hyg. & Occup. Dis., Kiev, USSR) **Nekotorye voprosy kin-tiki nakopleniya v vydeleniya tiokarbaminovykh pestitsidov iz organizma teplokrovnykh. [Kinetics of the accumulation and elimination of thiocarbamine pesticides from warm-blooded animals.]** *Gig. Sanit.* 43(6): 101-103; 1978. (5 references) (Russian)

The kinetics of accumulation, elimination and metabolism of Ro-neet (cycloate) (LD_{50} 2,300 mg/kg), tillam (pebulate) (LD_{50} 1,125 mg/kg) and yalan (molinate) (LD_{50} 657 mg/kg) was studied in white rats. Tillam and yalan were found to be detoxified rapidly following intragastric administration; no toxic compounds were found among the metabo-

lites of tillam in the urine. Four metabolites of yalan were found in all organs 30 min after administration, and they persisted for 24 hr. Metabolites of yalan were found in the blood for 2 days. Ro-neet was found to be metabolized to toxic metabolites such as cyclohexylamine and dicyclohexylamine; concentrations in the urine reached maximum 24 hr after administration.

79-0395. Khristeva, V. V.; Spasovskii, M. Kh.; Khinkova, L. S. (Inst. Hyg. & Nutr., Mut., Med. Acad., Sofia, Bulgaria) **Eksperimental'noe obosnovanie PDK kumarinovogo ratitsida Ratrona. [Experimental substantiation of the maximum allowable concentration of the coumarin derivative rodenticide Ratrone.]** *Gig. Tr. Prof. Zabol.* (7): 49-51; 1978. (Russian)

The acute, subacute and chronic toxicity of Ratrone [(3α-phenyl- β-acetylene)- 4-hydroxy coumarin] was studied in albino rats, rabbits, and guinea pigs. THe oral LD16, LD50 and LD84 in rats were found to be 1.13 g/kg, 1.55 g/kg, and 2.10 g/kg, respectively. The LC16, LC50 and LC84 values are 240, 320 and 420 mg/m^3, respectively. The cutaneous LD16, LD50 and LD84 values are 1.05 g/kg, 1.4 g/kg and 1.85 g/kg. The cumulation factor was found to be 0.40, which indicates the high risk of chronic poisoning. The acute oral threshold dose was found to be 1 g/kg, the chronic threshold concentration in the air 0.5 mg/m^3. Disturbances in blood clotting were the cardinal symptoms of poisoning. In view of the pronounced cumulation and high chronic toxicity, the interim maximum allowable concentration of Ratrone in the air should be established at 0.05 mg/m^3.

79-0396. Kuz'minskaya, U. A.; Yakushenko, V. E.; Versan, L. V. (Inst. Hyg. & Toxicol. Pestic. Polymers & Plast. Mat., Kiev, USSR) **Vozdeistvie dlitel'nogo postupleniya nekotorykh pestitsidov na aktinost' detoksitsiruyushchei sistemy pecheni. [Effect of long-term exposure to pesticides on the detoxifying activity on the liver.]** *Gig. Tr. Prof. Zabol.* (7): 57; 1978. (Russian)

The effects of 1 to 6 mo treatment of albino rats with intragastrically administered 0.01 and 0.001 LD50 doses of DDT (3.5 and 0.35 mg/kg/day), lindane (1.6 and 0.16 mg/kg/day), polychlorocamphene (toxaphene) (2.4 and 0.24 mg/kg/day), milbex (21 mg/kg/day), phosalone (1.32 mg/kg/day) and TMTD (thiram) (6 and 0.6 mg/kg/day) on the hepatic dimethylase activity was studied. Aminopyrine was used as a substrate. Except for TMTD, all other pesticides were found to induce dimethylase. Phosalone, administered for 3 to 6 mo, induced dimethylase by a factor of 1.6. During 6 mo of administration, TMTD reduced the dimethylase activity by 33%.

79-0397. Hurkat, P. C. (J. L. N. Med. Coll., Ajmer 305001, India) **A comparative study of dieldrin-induced hepatotoxicity in rabbits (*Oryctolagus cuniculus*) and rats (*Rattus albicans*): histological and histochemical aspects.** *Indian J. Anim. Sci.* 47(11): 752-761; 1977. (22 references)

Twenty rats and 20 rabbits were given dieldrin dissolved in groundnut- oil at the rate of 5 and 2.5 mg/kg, respectively, on alternate days. Both species exhibited histopathological changes. They were much more marked and extensive in the rabbits. Protein rich diets provided a certain amount of protection against the hepatotoxic influences of dieldrin. There was no evidence of carcinogenicity in these animals from the doses of dieldrin.

79-0398. Ramakrishna, N.; Ramachandran, B. V. (Indian Drug Res. Lab., Poona 411005, India) **Malathion-fenitrothion synergism.** *Indian J. Biochem. Biophys.* 15(2): 77; 1978.

Small amounts of fenitrothion were found to sensitize mice to such an extent that subsequent exposures to sub-lethal doses of malathion proved fatal. A 100 mg/kg dose of fenitrothion (0.1 of lethal dose) can reduce the LD50 concentration of a dose of malathion given 18 hr later to 0.1 of normal. A correlation is made between this synergism and the inhibition of unspecific carboxylesterases as the basis of the synergistic effect. [At the 1977 annual meeting of Biochemists.]

79-0399. Datta, H. (Dep. Biochem., Calcutta Univ., Calcutta 700019, India) **Effect of organophosphorous pesticides on air breathing fish *Cl Batrachus* (Linn) with special reference to its skin mucopoly saccharidase activity.** *Indian J. Biochem. Biophys.* 15(2): 77; 1978.

The air breathing fish *Cl Batrachus* (Linn.) was exposed to organophosphorus pesticides in its surrounding environment. An increase to skin mucopolysaccharidase activity was noted. This was found to be directly proportional to the degree of cell degradation and to the degree of intoxication suffered by the fish. [At the 1977 annual meeting of Biochemists.]

79-0400. Khan, F. A.; Srivastava, V. M. L.; Tewari, C. P. (Dep. Biochem., Univ. Lucknow, Lucknow, India) **Biochemical studies on Iomex toxicity.** *Indian J. Biochem. Biophys.* 5(2): 77-78; 1978.

Iomex given i.p. at 1 mg/kg to male albino rats for four successive days caused a decrease in plasma cholesterol and glucose. Urea and lactic acid levels were not significantly changed. A significant reduction was noted in aminopyrine-*N*-demethylase and aniline hydroxylase, which are microsomal drug metabolizing enzymes. Succinate dehydrogenase and glucose-6- phosphate dehydrogenase activities were significantly reduced. Glycolytic enzymes such as aldolase and lactate dehydrogenase activities were elevated. These results indicate a shift in the metabolism of Iomex in rats from aerobic to anaerobic pathways. [At the 1977 annual meeting of Biochemists.]

79-0401. Jayapragasam, M.; Jasmine, I.; Rajukannu, V. (Dep. Biochem., Tamil Nadu Agric. Univ., Coimbatore 641003, India) **Effect of carbofuran on tissue ATPase and**

acetylcholinesterase of rats. *Indian J. Biochem. Biophys.* 15(2): 78; 1978.

Carbofuran was given p.o. to albino rats at a level of 10 ppm. The rats were killed within 15 min following dosing, when maximum convulsions occurred. A decrease was noted in the adenosine triphosphatase (ATPase) activity in the liver, intestine, and brain, with a complete inhibition of acetylcholinesterase activity in the serum and brain. The liver contained most of the parent compound in an unmetabolized state. When rats were given carbofuran at 1 ppm for 45 days, acetylcholinesterase inhibition was only about 8% and no changes in ATPase activities were noted in the various tissues examined. The parent chemical was again found in the liver, but this time there was also a metabolite present, 3-hydroxycarbofuran. [At the 1977 annual meeting of Biochemists.]

79-0402. Misra, D.; Khanna, R. N. (Ind. Toxicol. Res. Cent., Lucknow 226001, India) **Effect of fenitrothion on magnesium level and cholinesterase activity of rats.** *Indian J. Biochem. Biophys.* 15(2): 78; 1978.

Dermal application of fenitrothion to rats at 750 mg/kg caused a decrease in plasma cholinesterase activity during the first 8 hr followed by a gradual increase in that activity up to 24 hr after application. At the same time cholinesterase activity in the red blood cells decreased up to 2 hr after application, increased at 4 hr, and subsequently declined. Fenitrothion caused a slight increase in magnesium levels in plasma and a decrease in magnesium levels in red blood cells. There was an inverse correlation in plasma between the magnesium level and cholinesterase activity. [At the 1977 annual meeting of Biochemists.]

79-0403. Makhija, S. J.; Kachole, M. S.; Hanifi, H. S.; Pawar, S. S. (Biochem. Sect., Chem. Dep., Marathwada Univ., Aurangabad, India) **Insecticide intoxication, ALA-synthetase and mixed functions oxidase system in rats.** *Indian J. Biochem. Biophys.* 15(2): 78; 1978.

After exposure to endrin for a period of seven days an increase was noted in aminopyrine *N*-demethylation with a parallel increase in cytochrome b_5 and cytochrome *c* reductase activity. Similar exposure to Baygon (propoxur) caused similar effects, with an added increase in ALA-synthetase activity. ALA-synthetase and heme activities increased in male rats on exposure to thiodemeton (disulfoton), and decreased in female rats, indicative of a sex-controlled response. However, in each sex, cytochrome *c* reductase and aminopyrine *N*-demethylation were increased. A decrease in the magnitude of carbon monoxide binding was noted with microsomes in a reduced state as a response to all of the insecticides studied. [At the 1977 annual meeting of Biochemists.]

79-0404. Galdhar, N. R.; Fawade, M. M.; Halde, U. K.; Pawar, S. S. (Dep. Biochem., Gov. Med. Coll., Miraj, India) **Acid and alkaline phosphatase activities during pesticide intoxication.** *Indian J. Biochem. Biophys.* 15(2): 78; 1978.

Various insecticides, among them BHC, thiodemeton (disulfoton), and endrin, decreased alkaline phosphatase activity in adult female rats. Neither Baygon (propoxur) nor malathion elicited this response. Endrin, Baygon and malathion decreased acid phosphatase activity in male rats. BHC and thiodemeton caused a slight increase in acid phosphatase activity in male rats. In females, exposure to these insecticides caused an increase in acid phosphatase activity, with the exception of endrin exposure. [At the 1977 annual meeting of Biochemists.]

79-0405. Bhatnagar, V. K.; Malviya, A. N. (Dep. Biochem., S. N. Med. Coll., Agra, India) **Changes in some biochemical indexes in rat upon pesticide toxicity.** *Indian J. Biochem. Biophys.* 15(2): 78; 1978.

Malathion at 687.5 mg/kg and DDT at 175.0 mg/kg, were given orally to adult male rats which had been fasted for 16 hr. Hyperglycemia resulted, along with a lowering of cholinesterase activity. The findings allowed a correlation to be drawn between the body weight, liver weight, and lethal dose. No change was noted in the physical behavior of the animals after administration of the chemicals, either singely or in combination, nor was there a change in body weight. However, the weight of the liver did increase. [At the 1977 annual meeting of Biochemists.]

79-0406. Kaphalia, B. S.; Seth, T. D. (Ind. Toxicol. Res. Cent., Lucknow, India) **Isomers and metabolites of DDT and BHC in blood plasma, adipose tissue and cerebro-spinal fluid (CSF) of persons of Lucknow.** *Indian J. Biochem. Biophys.* 15(2): 79; 1978.

Analysis was made of blood plasma samples for the detection of isomers and metabolites of DDT and BHC by gas liquid chromatography. Samples studied were taken from persons who had been exposed to these chemicals, as well as from persons not exposed. Samples were also taken of the adipose tissue from young people and five specimens of cerebrospinal fluid were taken from children who residue in Lucknow. Of the total DDT detected, 67-70% was present as *p,p'*-DDE. The average value of DDT including metabolites (DDE + TDE), present in the normal population sampled was 27.551 ppb as compared to 199.66 ppb in the exposed population. The average BHC concentration in unexposed persons was 74.73 ppb, as compared with 295.27 ppb in those exposed. Residue levels were 63 and 31 times higher in the adipose tissue for total DDT and BHC, respectively, when compared to the plasm levels. In cerebrospinal fluid in children, traces of γ-BHC (lindane) were found in only two samples, while DDT was not present in any sample tested. [At the 1977 Annual Meeting of Biochemists.]

79-0407. Srinivasan, K.; Radhakrishnumurty, R. (Biochem. & Appl. Nutr., Cent. Food Technol. Res. Inst., Mysore 570013, India) **Biochemical changes induced by β- & γ- isomers on BHC in albino rats.** *Indian J. Biochem. Biophys.* 15(2): 79; 1978.

The β-isomer of BHC fed to albino rats at 8000 ppm for 15 days decreased the levels of hepatic alkaline and acid phosphatase activities by 45 and 40%, respectively. Such exposure increased the levels of these enzyme activities in the kidney by 130 and 30%, respectively. The hepatic alanine aminotransferase activity was increased by 80%, along with a decrease in the kidney activity of this enzyme by 35%. Hepatic aspartate aminotransferase was decreased in activity by 30%. Hepatic lactate dehydrogenase, glucose-6-phosphatase dehydrogenase activity was increased. The γ-isomer (lindane) similarly affected hepatic aminotransferase and phosphatase activities, but did not affect the kidney enzymes. [At the 1977 Annual Meeting of Biochemists.]

79-0408. Koundinya, P. R.; Ramamurthi, R. (Dep. Zool., S. V. Univ., Tirupati 517502, India) **Effect of Sumithion (fenitrothion) on some selected enzyme systems in the fish *Tilapia mossambica* (Peters).** *Indian J. Exp. Biol.* 16(7): 808-811; 1978. (13 references)

Tilapia mossambica fish were maintained in tapwater and exposed to commercial grade Sumithion (fenitrothion) EC 50% which is used in rice fields locally to control rice stem borer. Exposure to lethal concentrations, 6 mg/l, caused an inhibition of the acetylcholinesterase activity in the nervous system and other tissues along with an increase in acetylcholine content. SDH activity was decreased, while LDH activity was increased, indicating a favoring of anaerobic metabolism of Sumithion in treated fish to meet energy demands.

79-0409. Mitra, P. K.; Sud, S. C.; Bahga, H. S. (Dep. Physiol. & Pharmacol., Coll. Vet. Med., G. B. Pant Univ. Agric. & Technol., Pantnagar, India.) **Acute oral toxicity of metasystox in buffalo calves.** *Indian J. Exp. Biol.* 16(7): 813-815; 1978. (21 references)

Metasystox containing 25% methyl-demeton was applied at a rate of 180 mg/kg to study acute oral toxicity in 7 male buffalo calves of 10 to 12 mo of age. As soon as evidence of poisoning was present, calves were treated with atropine, *d*-tubucurarine/gallamine and glucose. Symptoms of such poisoning were present from 15 to 35 min after the single oral dose was administered. Death occurred between 1.5 and 26 hr later. Alertness in general posture was followed by profuse watery salivation, increased bronchial secretion and lacrimation. Respiration rate increased, followed by respiratory distress, dyspnea and bradycardia. Tremors occurred in skeletal muscle and the pupils constricted. No significant change was seen in the total erythrocyte count, total leucocyte count, hemoglobin content, or packed cell volume. Blood glucose, blood lactic acid and serum LDH activities increased significantly. No gross pathognomonic post mortem findings were revealed. Moderate congestion was present in the lungs, heart, kidneys and liver. Catarrhal enterites, especially of the small intestines, was found with profuse watery secretion.

79-0410. Touitou, Y.; Bogdan, A. (Serv. Biochim. Fac. Med. Pitie-Salpetriere, F-75634 Paris Cedex 13, France) **Influences of *o,p'*-DDD, *o,p'*-DDE and solubilization procedures on the *in vitro* biosynthesis of 18-hydroxycorticosterone and aldosterone by sheep adrenals.** *Int. J. Biochem.* 9(9): 639-708; 1978. (7 references)

Studies were carried out to determine if *o,p'*-DDD (TDE) and *o,p'*-DDE act as steroidogenesis inhibitors *in vitro* when added to the culture as a powder or when dissolved first in a variety of organic solvents. The organic solvents were also tested for inhibitory effects. Labeled steroids, cofactors, reagents and various concentrations of DDD and DDE were added to sheep adrenal homogenates. Following incubation, steroids were isolated and characterized. Concentrations of 0.01 m*M* to 1.0 m*M* DDD or DDE did not decrease the symptoms of adrenal steroids; however, higher concentrations (10 m*M*) did have an inhibitory effect.Inhibition was the same if the compounds were added as a powder or if dissolved in a solvent. All solvents acted as inhibitors.

79-0411. Motoyama, N.; Dauterman, W. C. (Dep. Environ. Sci., Fac. Hortic., Chiba Univ., Chiba-ken 271, Japan) **Multiple forms of rat liver glutathione *S*- transferase: specificity for conjugation of *O*-alkyl and *O*-aryl groups of organophosphorus insecticides.** *J. Agric. Food Chem.* 26(6): 1296-1301; 1978. (21 references)

Multiple forms of glutathione *S*-transferases were partially purified from rat liver, using 1-chloro- 2,4-dinitrobenzene as the substrate to monitor activity. Their properties were studied, especially with regard to the specificity of *O* -alkyl and *O*-aryl conjugations of organophosphorus insecticides. Substrates studied were diazinon and methyl parathion as well as 3,4-dichloronitro benzene and methyl iodide. Based upon the nature of the binding to a DEAE-celulose collume, pH-activity relationships, and preference for alkyl and aryl conjugations, the rat liver enzymes were classified into two major groups, each of which was further separated on CM-cellulose and hydroxylapatite columns. The multiple forms showed distinctive or overlapping properties. Their identity with those reported previously is discussed. (Author abstract reprinted by permission of the American Chemical Society)

79-0412. Wing, K. D.; Hammock, B. D.; Wustner, D. A. (Div. Toxicol., Dep. Entomol., Univ. California, Riverside, CA 92521) **Development of an *S*-bioallethrin specific antibody.** *J. Agric. Food Chem.* 26(6): 1328-1333; 1978. (45 references)

Residue analysis of the pyrethrins and allethrin as well as newer pyrethroid insecticides not containing halogens such as resmethrin and phenothrin is expensive, tedious, and/or of poor sensitivity. The structure of such pyrethroids suggests that they can be analyzed quickly, inexpensively, and at low levels by radioimmunoassay. Reaction of *S*-bioallethrin (1R,3R,4'S) with carboxy methoxylamine hemi-hydrochloride led to quantitative conversion to its carbomethxy oxime derivative. Alternatively, hydroboration-oxidation of

S-bioallethrin with disiamylborane led to selective oxidation at the terminal olefin with little loss of specific rotation. Quantative reaction with succinic anhydride gave *S*-bioallethrin hemisuccinate which was conjugated via its *N*-hydroxysuccinimide active ester to tyramine, hemocyanin, or bovine serum albumin (BSA). Rabbits immunized with allethrin-hemocyanin yeilded a serum reacting with hemocyanin or allethrin-BSA but not BSA as determined by immunodiffusion. Appearance of the precipitin band to allethrin-BSA could be inhibited by *S*-bioallethrin, but not by higher levels of permethrin, parathion, carbaryl, DDT, or an inactive allethrin isomer (1*S*,3*R*,4′*R*). The potential of immunochemical methods for residue analysis is discussed. (Author abstract reprinted by permission of the American Chemical Society)

79-0413. Zerba, E.; Fukuto, T. R. (Inst. Invest. Cient. & Tech., Fuerzas Armadas, Buenos Aires, Argentina) **Hydrolytic and toxicological properties of ethyl α-cyanobenzaldoxime phosphoramidates.** *J. Agric. Food Chem.* 26(6): 1365-1369; 1978. (19 references)

A series of ethyl alkylphosphoramidate esters of α -cyanobenzaldoxime and ring-substituted α-cyanobenzaldoximes were synthesized and examined for alkaline hydrolysis, anticholinesterase activity, and toxicity to houseflies and mice. The compounds showed variable toxicity to houseflies and mice and were effective inhibitors of acetylcholinesterase. Satisfactory correlation was obtained between alkaline hydrolysis rate constants and anticholinesterase activity with Taft's and E*s* values. Toxicity to houseflies was related to anticholinesterase activity and Hansch's π constants. Several of the compounds were of low toxicity to the white mouse but were highly effective against the housefly. (Author abstract reprinted by permission of the American Chemical Society)

79-0414. Hansen, L. G.; Dorn, S. B.; Sundlof, S. M.; Vogel, R. S. (Div. Vet. Toxicol., Coll. Vet. Med., Univ. Illinois, Urbana, IL 61801) **Toxicity, accumulation, and depletion of hexachlorobenzene in laying chickens.** *J. Agric. Food Chem.* 26(6): 1369-1374; 1978. (14 references)

Laying pullets were given seven consecutive daily oral doses of hexachlorobenzene (HCB) ranging from 1 to 100 mg/kg. At higher doses, HCB delayed the onset of full egg production but also appeared to offer protection against development of hemorrhagic fatty liver. Relative accumulation of HCB in fat was inversely related to dose, but elimination from fat was constant for residue concentrations from 3-800 ppm. Elimination half-time from fat was estimated at 24-27 days and more than half of the elimination was due to parent compound excreted in egg yolks. Other tissues generally paralleled fat, but skin became an increasingly significant reservoir and liver concentrations remained rather constant. (Author abstract reprinted by permission of the American Chemical Society)

79-0415. Gaughan, L. C.; Robinson, R. A.; Casida, J. E. (Pestic. Chem. Lab., Dep. Entomol. Sci., Univ. California, Berkeley, CA 94720) **Distribution and metabolic fate of *trans*- and *cis*- permethrin in laying hens.** *J. Agric. Food Chem.* 26(6): 1374-1380; 1978. (18 references)

Radiocarbon from ^{14}C-carbonyl- and ^{14}C-methylene-labeled preparations of (1*RS*)-*trans*- and (1*RS*)-*cis*-permethrin,administered to laying hens for 3 consecutive days at 10 mg/kg for each dose, is largely eliminated from the body within 1 day after the last dose, a portion as $^{14}CO_2$. The excreta contain all and the eggs most of the following compounds identified by thin-layer cochromatography with authentic standards and specific enzymatic hydrolysis: the unmetabolized pyrethroids; *cis*-permethrin hydroxylated at the 4′-position, at the methyl group *trans* to the carboxyl, and at both of these sites; the dichlorovinyl acids and their derivatives hydroxylated at the *trans*- or *cis*-methyl group; phenoxybenzyl alcohol, phenoxybenzoic acid and their 4′-hydroxy derivatives; sulfate, glucuronide, taurine, and other conjugates of these alcohols and acids. Residues of unmetabolized *trans*- and *cis*-permethrin in fat are 0.15 and 0.93 ppm, respectively, at 7 days after the last dose, in eggs they reach peak levels of 0.3 and 1.2 ppm, respectively, at 3-4 days after the last dose. (Author abstract reprinted by permission of the American Chemical Society)

79-0416. Ivey, M. C.; Palmer, J. S.; Hooten, E. C. (US Livestock Insects Lab., SEA USDA, Kerrville, TX 78028) **Chlorpyrifos and 3,5,6-trichloro-2-pyridinol: Residues in the body tissues of cattle wearing chlorpyrifos-impregnated plastic ear bands.** *J. Econ. Entomol.* 71(4): 697-700; 1978. (3 references)

Residues of the insecticide chlorpyrifos and its metabolite 3,5,6-trichloro- 2-pyridinol (pyridinol) were determined in the body tissues of Hereford yearlings at intervals after they had a 10% chlorpyrifos-impregnated plastic band attached to each ear. Each band contained ca. 3.3 g of chlorpyrifos; therefore, each animal was initially exposed to ca. 6.6 g of chlorpyrifos. Residues of chlorpyrifos were found in fatty tissues only (maximum 0.091 ppm at 2 wk biopsy) with the exception of the muscle of one animal at 5-wk posttreatment slaughter that contained a residue of 0.010 ppm. Residues of pyridinol were found only in fat, liver, and kidney tissues (max 0.037 ppm in kidney at 5-wk posttreatment slaughter) and 2 heart samples each containing pyridinol residues of 0.01 ppm. Attachment of the bands to the ears resulted in moderate to severe necrosis in one or both ears of each animal. (Author abstract by permission)

79-0417. Bouldin, T. W.; Cavanagh, J. B. (Univ. North Carolina, Chapel Hill, NC 27514) **Correlation of light- and electron-microscopic abnormalities in organophosphorous neuropathy.** *J. Neuropathol. Exp. Neurol.* 37(5): 593; 1978.

In this study young adult cats were given single ip injections of di-isopropyl fluorophosphate (DFP), 40 mg/kg, following atropine and physostigmine treatment. After twenty days single nerve fibers from the distal 2 cm of the

left recurrent laryngeal nerve were prepared from microscopic examination. An accumulation of axonal granular reticulum and distal internodal varicosities were the principle abnormalities associated with organophosphorous neuropathy as assessed by electron and light microscopy. It was concluded that axonal degradation in an organophosphorus neuropathy is initially focal and proceeds centrifugally.

79-0418. Cavanagh, J. B.; Gregson, M. (Inst. Neurol., Queen Square, London WCIN 3AR, England) **Some effects of a thallium salt on the proliferation of hair follicle cells.** *J. Pathol.* 125(4): 179-191; 1978. (21 references)

In an effort to study the effect of thallium salts, which are used as rodenticides, on hair follicle cells, baby rats were injected with 30 mg/kg thallous sulphate on the 4th or 7th day after birth. The animals were sacrificed at various times thereafter, and skin samples were prepared and examined microscopically. The mitotic rate in hair follicle cells of treated animals was compared with rates found in control animals. In animals treated at 4 days, no effect on mitotic rate was noted at 24 hr; however, at 48 hr, there was a marked decrease in the number of cell divisions in the follicles. After six days, mitotic activity increased, indicating recovery from the effect of thallium. Animals treated at 7 days showed a drop to about 50% of normal mitotic activity at 24 hr, and a further drop at 48 hr. In both instances, the decrease in mitotic activity was associated with dying cells, and further studies in cell cycle times showed that there was actually a slow, steady decrease in activity that led to cell death. The authors suggest that some important metabolic mechanism was gradually running down.

79-0419. Roberts, I. H.; Wilson, G. I.; Meleney, W. P. (Author address not given) **Evaluation of phosmet for the control of the common scabies mite on cattle.** *J. Am. Vet. Med. Assoc.* 73(7): 840-842; 1978. (9 references)

Thirty-four young range cattle heavily infested with the common scabies mite, *Psoroptes ovia,* were dipped in phosmet (*O,O*-dimethyl phosphoroditioate *S*-ester with *N*-(mercaptomethyl) phthalimide) in 15 trials. All concentrations from 0.15% to 0.25% that were applied once failed in at least one trial, but all concentrations from 0.075% to 0.20% were successful in eradicating mites when used twice at 7- 10-day intervals. One single dip tried at 0.30% also was successful. Uninfested yearlings were dipped in 0.30% phosmet without apparent intoxication, but 2-yr-old cattle treated in a spray-dip machine at 0.40% active ingredient became depressed and stiff gaited. (Author abstract by permission)

79-0420. Van Gelder, G. A. (Author address not given) **Toxicology of pentachlorophenol for livestock.** *J. Am. Vet. Med. Assoc.* 173(7): 885-886; 1978.

Pentachlorophenol (PCP) is wood preservative found in treated wood in barns. Pentachlorophenol residues have been found in cattle. Cattle fed 0.05, 0.5, or 5.0 mg/kg for 14 days had steady-state blood levels of 54,494, or 2,432 ppb PCB, respectively. There were no clinical effects. Blood PCB half-life was less than 2 days. Concentrated contaminants in technical PCP were fed to calves and rats. The single dose LD50 was 2 g/kg in rats. A 14-day toxic dose in calves was 4 mg/kg. The dosages represent the grams of PCP extracted. (Author abstract by permission)

79-0421. Nazarov, S. S.; Illarionov, A. I. (Voronezh Agric. Inst., Voronezh, USSR) **Toksichnost' fosfororganicheskikh insektitsidov dlya medonosnykh pchel. [Toxicity of organophosphorus insecticides to honey-bees.]** *Khim. Sel'sk. Khoz.* 16(7): 61-63; 1978. (7 references) (Russian)

The contact and oral toxicity of organophosphorus pesticides was studied in adult and young honey-bees. The experiments with surfaces contaminated with pesticides revealed contact LD50 values of 9.62 μg for phosalone, 1.299 μg for gardona (tetrachlorvinphos), 0.421 μg for basudin (diazinon), and 2.36 μg for trichlorfon in adult bees, and 5.78, 0.647, 0.267 and 2.14 μg respectively, in young bees. In adult bees, the oral LD50 values were 4.48 μg for phosalone, 0.68 μg for gardona, 0.108 μg for basudin, and 0.725 μg for trichlorfon. The corresponding values were 10.17 μg, 2.257 μg, 0.093 μg, and 0.479 μg in young bees.

79-0422. Elmer, G. W.; Powell, M. L.; Trafer, W. F. (Dep. Pharm. Sci. Sch. Pharm., Univ. Washington, Seattle, WA 98195) **Warfarin metabolism by rat intestinal microflora.** *Lloydia* 40(6): 610-611; 1977.

Metabolism studies of warfarin indicated that the main route for excretion was through the bile; 10% of the given dose was excreted within 5 hr after injection. The feces contained relatively little radioactivity. Therefore, considerable enterohepatic recycling was apparently occurring. Warfarin was largely associated with the glucuronides of warfarin and 4'-, 6-, 7-, and 8-hydroxywarfarin. Hydrolysis *in vitro* occurred due to the action of intestinal microflora. In *in vivo* experiments germ-free rats excreted 3 times as much warfarin in the feces and about half as much in the urine when compared with normal rats. These findings concur with the belief that intestinal microflora facilitate enterohepatic recycling of warfarin and its metabolites by hydrolyzing the polar glucuronide conjugates.

79-0423. Cantelmo, F. R.; Rao, K. R. (Fac. Biol., Univ. West Florida, Pensacola, FL) **Effect of pentachlorophenol (PCP) on meiobenthic communities established in an experimental system.** *Mar. Biol.* 46(1): 17-22; 1978. (32 references)

A series of experiments were performed to determine the effects of pentachlorophenol (PCP) on marine benthic communities. Unfiltered sea water, a source of various marine organisms, was pumped into aquaria containing cleaned sand. The organisms established themselves in the sand. PCP dissolved in ethanol in concentrations of 7, 76, and 622 μg/l was introduced (continuous feed) into tanks. Control tanks were subjected to only ethanol in the same concentrations as the experimental tanks. Nematodes made up 87% of all the

meiofauna after 9 wk. Statistically significant variations occured. Compared to the controls and 7 μg PCP groups, the total meiofauna and nematodes were higher in the 76 μg PCP/l and lower in the 622 μg PCP/l tanks. Also noted was a decrease in epistrate feeders in 622 μg PCP/l tanks. On the other hand, selective deposit feeders increased as the concentration of PCP was increased, i.e. 19% of the nematodes in the 76 μg PCP/l water and 61% in 622 μg PCP/l water. Therefore, changes in biomass and density as well as a shift in community structure was caused by PCP.

79-0424. Bengtsson, B. E. (Brackish Water Toxicol. Lab., Natl. Environ. Prot. Board, S-61101 Nykoping, Sweden) **Use of a harpacticoid copepod in toxicity tests.** *Mar. Pollut. Bull.* 9(9): 238-241; 1978. (26 references)

A number of harpacticoids were caught in sediment from a static brackish water aquarium with prawns that had run for about one year at room temperature and in which prawns had been randomly fed with pelleted salmon food. A series of steps was undertaken to select the most tolerant laboratory animal. To investigate the usefulness of *Nitocra spinipes* as a test organism for acute toxicity, a series of static tests were performed with 15 metal chlorides; each metal being tested in a series of ten concentrations, with narrow intervals. Chemicals included magnesium, aluminum, potassium, calcium, manganese, iron, cobalt, nickel, copper, zinc, strontium, cadmium, tin, barium, and mercury. When compared to freshwater experiments on the toxicity of heavy metals to *Daphnia*, and 96 hr median lethal concentrations values obtained in this study are higher, but they are lower than values from toxicity experiments on marine invertebrates. Because of the great possibilities of different metal speciation in the present and in reviewed studies, it is not possible as yet to conclude whether *N. spinipes* is more or less tolerant than other small crustaceans to the tested elements. Effects on reproduction and mortality during two week periods were tested using *p,p'*-DDE and *p,p'*-DDE methyl sulfone. The *p,p'*-DDE was the most toxic. It is concluded that *N. spinipes* is a suitable toxicity test organism in brackish water.

79-0425. Kitchin, K. T.; Woods, J. S.* (Lab. Environ. Toxicol., NIEHS, Research Triangle Park, NC 27709) **2,3,7,8-Tetrachlorodibenzo- *p*-dioxin induction of aryl hydrocarbon hydroxylase in female rat liver. Evidence for *de novo* synthesis of cytochrome P-448.** *Mol. Pharmacol.* 14(5): 890-899; 1978. (54 references)

The effects of 2,3,7,8-tetra chlorodibenzo- *p*-dioxin (TCDD) on heme synthesis and the synthesis of cytochrome P448, as reflected in aryl hydrocarbon hydroxylase activity, were determined in female rat liver. TCDD treatment did not increase the activity of δ-aminolevulinic acid synthetase, the rate limiting enzyme in heme biosynthesis. In contrast, a 23-fold increase in the level of cytochrome P448 mediated aryl hydrocarbon hydroxylase was observed 24 hr after TCDD treatment. Actinomycin D and cycloheximide, but not $CoCl_2$, completely prevented the induction of new cytochrome P448 and increased aryl hydrocarbon hydroxylase activity by TCDD. *In vitro* reconstitution of cytochrome P450 and increases in enzymatically active aryl hydrocarbon hydroxylase levels were achieved by adding hemin to whole liver homogenates from rats given TCDD (a hemoprotein inducer) and $CoCl_2$ (a heme depleter). These results suggest that TCDD induces *de novo* protein synthesis of apocytochrome P448, which combines with heme to yield new cytochrome P448 and a concominant increase in aryl hydrocarbon hydroxylase activity. Therefore it is concluded that TCDD selectively induces the formation of cytochrome P448 leading to increased aryl hydrocarbon hydroxylase activity, and that protein synthesis, rather than heme synthesis, is the rate-limiting event in this process. (Author abstract by permission of Academic Press)

79-0426. Ruiz-Vazquez, R.; Pueyo, C.; Cerda-Olmedo, E. (Dep. Genet., Fac. Sci., Univ. Sevilla, Seville, Spain) **A mutagen assay detecting forward mutations in an arabinose-sensitive strain of *Salmonella typhimurium*.** *Mutat. Res.* 54(2): 121-129; 1978. (21 references)

Strain SV3 of *Salmonella typhimurium* is sensitive to arabinose, that is, unable to grow in a medium containing arabinose plus glycerol as carbon source. Arabinose resistance is the consequence of the mutational inactivation of one of at least three different genes. The selection of arabinose-resistant mutants provides a simple and sensitive assay for the detection of weak mutagens and for refined quantitative studies of strong ones. The assay is not influenced by experimental artifacts derived from physiological or lethal effects or from differences in plating density. Such artifacts are common with other bacterial mutagen assays, including those using strains analogous to SV3. As practical examples, the assay was used with *N*-methyl- *N'*-nitro- *N*-nitroso guanidine and the fungicide captafol. (Author abstract by permission)

79-0427. Kada, T.; Sadaie, Y.; Hara, M.; Shirasu, Y. (Natl. Inst. Genet., Mishima, Japan) **Correlations between DNA-damagens, mutagens and carcinogens.** *Mutat. Res.* 54(2): 214-215; 1978. (1 reference)

Bacterial rec- and reversion assays were carried out on 125 authentic chemicals distributed by Drs. Odashima, Kawachi and Nadadate (Ministry of Welfare, Japan) involving typical known carcinogens as well as on 193 pesticides currently used in Japan. Using improved procedures of rec- and reversion assays, the majority of mutagens were found in rec-assay positive chemicals and most (but not all) mutagens were rec-assay negative. Prediction percentages for carcinogenicity by rec- or reversion assay were almost similar. (Author abstract by permission)

79-0428. Moriya, M.; Kato, K.; Shirasu, Y.; Kada, T. (Inst. Environ. Toxicol., Kodaira, Tokyo, Japan) **Mutagenicity screening of pesticides in microbial systems. IV. Mutagenicity of dimethyldithiocarbamates and related fungicides.** *Mutat. Res.* 54(2): 221; 1978. (1 reference)

The mutagenicity of dimethyl dithiocarbamates and related fungicides was tested using *E. coli* WP2 *hcr, S. typhimurium* TA 1535, TA1537, TA1538, TA98, and TA100, since they were shown to be weakly positive in the rec-assay. TTCA, ferbam, ziram, TMTD (thiram), EMSC, and DDC were revealed to be mutagens for TA100. However, these fungicides were not mutagenic for the frameshift strains (TA1537, TA1538, and TA98). The *N*-diethyl derivatives of TMTD, ferbam, ziram and DDC, and the *N*-monomethyl derivative of ziram were not mutagenic toward TA100. These results indicate that the *N*-dimethyl group is essential for the mutagenicity of these compounds. (Author abstract by permission)

79-0429. Shirasu, Y.; Moriya, M.; Kato, K.; Tezuka, H.; Henmi, R.; Shingu, A.; Kaneda, M.; Teramoto, S. (Inst. Environ. Toxicol., Kodaira, Tokyo, Japan) **Mutagenicity testing on *o*-phenylphenol.** *Mutat. Res.* 54(2): 227; 1978.

A series of mutagenicity studies was conducted on the fungicide *o*-phenylphenol (OPP). In the microbial studies, the rec-assay using *B. subtilis* H17 and M45, the reversion assays with and without metabolic activation employing *E. coli* WP2 *hcr-* and 5 *S. typhimurium* TA strains (1535, 1537, 1538, 98 and 100), and the host-mediated assay with *S. typhimurium* G46 were performed on OPP. In the host-mediated assay, 7-wk-old JCL-ICR male mice were orally treated with 200 or 600 mg/kg of OPP for 5 consecutive days. Negative results were obtained in all the tests. In the cytogenetic studies, 4-wk-old Wistar male rats were treated orally with OPP in daily doses of 50, 100, 200, 400 and 800 mg/kg for 5 days or in single doses of 250, 500, 1000, 2000 and 4000 mg/kg. They were killed 24 hr after the final treatment. The bone-marrow cells were examined for chromosomal abnormalities. OPP produced no structural and numerical aberrations at any dose tested. In the dominant-lethal studies, daily oral doses of OPP were administered to C3H male mice at 100 or 500 mg/kg for 5 days. Each treated male mouse was mated with 2 untreated virgin females from the same stock weekly for 6 wk. OPP induced no dominant-lethal mutations at any stage of the spermatogenesis. (Author abstract by permission)

79-0430. Shirasu, Y.; Tezuka, H.; Henmi, R.; Teramoto, S.; Shingu, A.; Kaneda, M. (Inst. Environ. Toxicol., Kodaira, Tokyo, Japan) **Cytogenetic and dominant-lethal studies on captan.** *Mutat. Res.* 54(2): 227-228; 1978.

There was no significant increase in the number of structural and numerical aberrations of chromosomes of the human diploid fibroblast cells *in vitro* treated with captan at concentrations of 0.5, 1.5, 3.0 and 4.0 μg/ml for 4 or 24 hr. However, an increase of stickiness and a decrease of mitotic index were revealed in the treated cells. Cytogenetic effects *in vivo* were also studied on the metaphase chromosomes of the bone-marrow cells of male rats, 4 wk old, treated po by a single intubation with 0, 500, 1000 and 2000 mg/kg, or by consecutive 5-day administrations with 0, 200, 400 and 800 mg/kg/day. They were sacrificed 24 hr after the last injection. There was no increase of chromosomal aberrations in the bone-marrow cells of the treated animals at all the dosage levels. Dominant-lethal studies were performed in mice. Ten-wk-old male C3H mice were treated orally with captan at 0, 200 and 600 mg/kg/day for 5 consecutive days. The treated male mice were mated with untreated virgin ICR females for 6 wk. Captan induced no significant increase in the rate of embryonic death at any spermatogenesis tested. (Author abstract by permission)

79-0431. Takahashi, K. (Dep. Med. & Phys. Ther., Fac. Med., Univ. Tokyo, Tokyo, Japan) **Statistical evaluation of mutagenicity of a citrus fungicide orthophenylphenol (OPP).** *Mutat. Res.* 54(2): 255; 1978.

Experimental data leading to the conclusion that OPP provides no influence on mutagenicity were submitted to the government by scientists from the Institute of Pesticides Residues, in 1977. However, statistical analysis of the above revealed significant mutagenicity of OPP. The positive dose-response relation was proved between the number of aberrations of human diploid fibroblasts cultivated with OPP for 24 hr and the concentration of OPP in culture medium ranging from 0.1 to 1.0 μg/ml with significance above 0.2 μg/ml. Among the data on dominant-lethal mutation tests, three experiments were rejected statistically because of abnormally high or low values of ethyl methanesulfonate used as a positive control. Thereafter two values among three remaining experiments were also rejected because of abnormally large deviations from the means by Smirnoff's method; 8.4 for 100 mg/kg with standard deviation 1.07 and 8.5 for 500 mg/kg of OPP were obtained as the dominant-lethal coefficients, which were proved to differ significantly from zero. Further, the positive dose-response relation was suggested on host-mediated mutation test on mice innoculated with *S. typhimurium*, on back mutation test of frameshift type using TA98, and on the frequency of litters with early death. The negative dose response relation was suggested by mutagenicity tests of the frameshift type after activation of metabolism of TA1538 by the liver-homogenate S-9 Mix and on prenatal body weight of dams and fetuses. The number of animals, dose levels and replication were suggested to obtain more reasonable quantitative conclusion in detecting weak mutagenic effects of chemicals like OPP. (Author abstract by permission, modified)

79-0432. Vonk, J. W.; Mihanovic, B.; Sijpesteijn, A. K. (Inst. Org. Chem., TNO, Utrecht, The Netherlands) **A biochemical mechanism for the conversion of thiophanate- methyl into methyl benzimidazol- 2-yl carbamate (MBC) in plant tissue.** *Netherlands J. Plant Pathol.* 83(Suppl. 1): 269-276; 1977. (10 references)

Studies were carried out to elucidate the biochemical mechanism for the conversion of thiophanate- methyl, a systemic fungicide, into methyl benzimidazol- 2-yl carbamate (MBC), which is thought to be the active principle of thiophanate- methyl. To this end thiophanate- methyl was incubated with potato slices, potato homogenates, apple homogenates,

or sap pressed from cucumber seedlings. While control experiments using no plant tissue showed no measurable formation of MBC after 20 hr, results of cultures containing plant tissue showed greatly accelerated MBC formation, ranging from 13% with cucumber seedlings to 29% with apple homogenate. Heating destroyed the MBC-producing properties of potato and apple homogenates, implying that the reducing factor may be an enzyme. Studies with cell-free extracts and crude enzyme preparations from potato tubers suggest that the presence of the enzyme polyphenol oxidase (PPO) accelerates MBC production. Since it is known that *o*-quinones are formed during enzyme conversion of *o*-diphenyls by PPO, a further study was carried out in which *o*-quinones were generated and thiophanate- methyl was added to the reaction mixture. Again, fair amounts of MBC were formed, leading to the suggestion that the compounds which catalyze the formation of MBC may be quinones generated by PPO.

79-0433. Iwan, J.; Hertel, B.; Radzuweit, J. (Schering AG Berlin Bergkamen, D-1000 Berlin 65, BRD) **Transformations of prothiocarb in plant and soil.** *Netherlands J. Plant Pathol.* 83(Suppl. 1): 277-284; 1977. (4 references)

Experiments were performed to determine the sequence of transformations in the degradation of ^{14}C-labeled prothiocarb, *N*-(3-dimethyl aminopropyl- (1-^{14}C)- thiocarbamic acid- *S*-ethyl ester hydrochloride, in soils. The half life was 59 days in soils of high organic content and 144 days in acidic soils. The main route of degradation was by hydrolysis to *N,N*-dimethyl propane- 1,3-diamine, ethyl mercaptan and CO_2. In soil, demineralization then occurs. In plants, however, the *N,N*-dimethyl propane- 1,3-diamine moiety is still present. Therefore, for total residue analysis, this moiety is proposed as the target compound.

79-0434. Yoshida, T.; Homma, K.; Suzuki, Y.; Uchiyama, M. (Pharm. Inst., Tohoku Univ. Aobayama, Sendai 980, Japan) **Effect of organophosphorus insecticides on hepatic microsomal cytochrome P-450 in mice.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 3(1): 21-26; 1978. (23 references)

Fenitrothion was given by ip injection to mice at a dose of 100 mg/kg. A biphasic effect was subsequently observed on microsomal drug metabolism and cytochrome P450 content. Protoheme content was slightly decreased. The content of microsomal cytochrome b5 was not affected. When SKF 525A was used in pretreatment of the mice, some prevention against the decrease in cytochrome P450 was afforded. However a marked decrease in cytochrome P450 was noted when organothiophosphates were incubated with the microsomes with NADPH-generating system *in vitro*. These results suggest that the recovery and further increase in cytochrome P450 produced by fenitrothion is associated with the increased availability of heme in the liver through an increase in ALA synthetase activity. It is also suggested that the binding of sulfur to microsomes may result in a preclusion of the binding of carbon monoxide to a portion of cytochromes. This leads to a decrease in the characteristic absorption spectra when organothiophosphates containing a phosphate are double-bonded to a sulfur atom.

79-0435. Kato, Y.; Sato, K.; Hirano, M.; Matano, O.; Shirasu, Y.; Goto, S. (Inst. Environ. Toxicol., Kodaira, Tokyo 187, Japan) **Physiological and metabolic elimination of 1-(α,α-dimethyl benzyl)- 3-(*p*-tolyl) urea, dimuron in rats.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 3(1): 27-34; 1978. (5 references)

Dimuron was administered to rats at 50 mg/kg in a single oral dose. The chemical was rapidly cleared from the gastrointestinal tract with a biological half life of 6 hr. The radioactive content in the gut was reduced to less than 5% of the original dose. After 48 hr tissue retention accounted for 0.6% of the radioactivity, with the exception of the gut area. All tissues reached a maximum concentration within 6 hr. Levels detected in various organs were: liver 0.2 ppm, kidney 0.03 ppm, adipose tissue 0.15 ppm, blood 0.025 ppm, plasma 0.02 ppm, and carcass 0.05 ppm. After 120 hr these values had decreased to nondetectable levels. Biliary excretion accounted for 38.6% of the elimination in the first 48 hr. Through an enterohepatic cycle, 24.3% of the radioactive biliary excreta was reexcreted into the bile. Dimuron was metabolized to more than seven polar metabolites, but dimuron itself was not found in the urine. In fecal extracts several of the metabolites as well as dimuron itself were identified.

79-0436. Miyamoto, J.; Mikami, N.; Mihara, K.; Takimoto, Y.; Kohda, H.; Suzuki, H. (Res. Dep., Pestic. Div., Sumitomo Chem. Co. Ltd., Hyogo 665, Japan) **Biological activity of fenitrothion and its degradation products.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 3(1): 35-41; 1978. (28 references)

Derivatives of fenitrothion were prepared. These derivatives were oxidized at the 3-methyl group and included 3-hydroxy methyl fenitrothion and 3-formyl fenitrothion. The toxicity of these derivatives after ip dosing to experimental animals was higher than that of fenitrothion. The oxygen analogs were more toxic than fenitrooxon. The insecticidal activity, however, was much lower than that of fenitrothion. When *S*-methyl fenitrothion was tested in mice it was found to be less toxic that fenitrooxon. Fenitrothion proved more toxic than amino analogs of fenitrothion and fenitrooxon and their derivatives. All the degradation products were less toxic than fenitrothion to kilifish with the exception of 3-methyl-4-aminophenol. In daphnia, fenitrothion and fenitrooxon were the most toxic. The fenitrothion derivatives exhibited no mutagenic activity in *Salmonella typhimurium*, with the exception of 3-hydroxy methyl fenitrothion. This was the case regardless of the presence of mammalian hepatic metabolizing enzymes.

79-0437. Yamamoto, I.; Maki, S.; Sato, K. (Dep. Agric. Chem., Tokyo Univ. Agric., Setagaya-ku, Tokyo 156, Japan) **Metabolism of an aryl *N*-propyl carbamate *in vitro* by a rat liver enzyme system.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 3(1): 53-54; 1978. (3 references)

A rat liver enzyme system was used to metabolize 3-methyl phenyl *N*-propyl carbamate which was ^{14}C-labeled at the 3-methyl position. The following metabolites were

identified: 3-methylphenyl *N*-propyl carbamate, 3-methylphenol, 3-hydroxymethyl phenyl N-propyl carbamate, 3-carboxyphenyl *N*-propyl carbamate, 3-hydroxymethyl phenol, 3-methylphenyl carbamate, 3-methylphenyl *N*-2′- hydroxypropyl carbamate, 3-methylphenyl *N*-3′- hydroxypropyl carbamate, and 3-methyl- 4-hydroxyphenyl *N*-propyl carbamate. Microsomal hydrolysis was particularly effective against the carbamyl moiety. Mixed function oxidases were easily able to oxidize the 3-methyl substituent on the phenyl moiety. The metabolites formed indicate that metabolic attack on this compound initially occurs at almost all possible points.

79-0438. Kurozumi, A.; Kurokawa, T.; Yamaguchi, I.; Misato, T. (Agrochem. Div., Ageo Res. Lab., Nippon Kayaku Co. Ltd., Ageo, Saitama 362, Japan) **Phosphorylation of 3,3′-dimethyl- 4-hydroxybenzo phenone by soil microorganism (*Bacillus* sp.).** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 3(1): 59-60; 1978. (6 references)

Bacillus sp. were used in laboratory cultures to phosphorylate the hydroxy group of methoxyphenone, NK-049, a synthetic herbicide which inhibits carotenoid biosynthesis. ^{14}C-Labeled NK-049 was incubated with the bacteria for 3 days on mineral glucose medium. The labeled metabolite was extracted with ethyl acetate and the extract solution was subjected to thin layer chromatography on silica gel plates. The radioactive compound was methylated by diazomethane and removed in oily state after further purification by thin layer chromatography. Mass spectrometry of the phosphorylated metabolite gave the structure of *O*-[2-methyl- 4-(3′- methylbenzoyl) phenyl] phosphate.

79-0439. Rickard, R. W. ; Camper, N. D. (Dep. Microbiol., Clemson Univ., Clemson, S. C.) **Degradation of fluometuron by *Rhizoctonia solani*.** *Pestic. Biochem. Physiol.* 9(2): 183-189; 1978. (9 references)

Experiments were carried out to analyze the degradation of the herbicide fluometuron (a subsituted phenyl-urea) by *Rhizoctonia solani*. Labeled herbicide was introduced to pure cultures of *R. solani*. Extraction by ethyl acetate preceded analysis by liquid scintillation. After 35 days of incubation, no $^{14}CO_2$ or radioactive volatile products were detected. Of the radioactive material, 63% was associated with the organic phase, most degraded into seven nonpolar metabolites. Two were 1-methyl-3 (α, α, α- trifluorotolyl) urea (DMFM) and (3-trifluoromethyl- phenyl) urea (TFMA). The remaining five were not identified. A cometabolic degradative pathway is suggested by the incomplete degradation of fluometuron.

79-0440. Anonymous **Documentatie- en informatiedienst KNMP. [KNMP documentation and information service.]** *Pharm. Weekbl.* 113(13): 328-330; 1978. (12 references) (Dutch)

The control of *Pediculosis capitis*, and the side-effects of malathion used for control, are described. Muscular spasms, excessive perspiration, convulsions, and coma are the typical symptoms of poisoning by organophosphorus insecticides, such as malathion. Malathion is about 100 times less toxic than parathion. Its oral LD50 in rats is 1,500 mg/kg; the lethal dose in man is about 100 mg, and 2 mg in children under age 6 yr. The poisoning victims are treated with atropine (2-4 mg iv or im) during the first hour, and Toxogonin (250 mg, iv) during the first day.

79-0441. Curtis, L. R.; Mehendale, H. M. (Dep. Pharmacol. & Toxicol., Med. Cent., Univ. Mississippi, Jackson, MS 39216) **Potentiation of hepatotoxicity by carbon tetrachloride following preexposure to Kepone in the male rat.** *Pharmacologist* 20(3): 187; 1978.

Rats were exposed to 10 ppm Kepone (chlordecone), for a 15 day period, supplied in their daily ration. After this period of time rats were given a single challenge dose of 0, 25, 50, 100, or 200 μl carbon tetrachloride/kg body weight. Inhibition was noted 24 hr later in the excretion of phenolphthalein glucuronide in the biliary tract, but this inhibition was noted only at the two highest doses of carbon tetrachloride. All rats receiving Kepone followed by 200 μl/kg of carbon tetrachloride exhibited cholestasis. This was also noted in 50% of the rats receiving the 100 μl dose. Bile flow was not altered in any other treatment group. SGPT and SGOT were elevated in excess of 30 and 10 fold, respectively, in animals receiving both Kepone and carbon tetrachloride. No change was noted in animals receiving carbon tetrachloride without prior Kepone exposure. Liposis was noted in all Kepone-treated animals receiving carbon tetrachloride, and the incidence of focal necrosis increased with the dose.

79-0442. Gupta, P. K.; Ehrnebo, M. (Ind. Toxicol. Res. Cent., Lucknow 226001, India) **Toxicokinetics of α- and β-endosulfan (E) in rabbits.** *Pharmacologist* 20(3): 187; 1978.

Toxicokinetics of the α- and β-isomers of endosulfan were studied following a 2 mg/kg iv dosing of endosulfan containing the isomers in the ratio of 7:3. Dosing was administered through the femoral vein of the rabbit after cannulation. The results of the study suggest that the β-isomer is the more quickly metabolized of the two. It is also more readily and rapidly excreted. [At the 1978 joint meeting of the American Society for Pharmacology & Experimental Therapeutics and the Society of Toxicology.]

79-0443. Livesey, J. C.; Anders, M. W. (Dep. Pharmacol., Univ. Minnesota, Minneapolis, MN 55455) **Glutathione-dependent metabolism of vicinal-dihalides to olefins.** *Pharmacologist* 20(3): 187; 1978.

The *in vitro* metabolism of 1,2-dichloroethane to ethylene was studied using enzymes from rat hepatic and renal cytosol as catalysts. The hepatic enzyme required GSH for activity. The reaction was inhibited by *p*-chloro mercuribenzoate and diethyl maleate. No inhibitory effect was caused by cyanide, fluoride or SKF 525A. The preliminary studies suggest that 1,2-dibromoethane is converted to ethylene *in*

vivo. [At the 1978 joint meeting of the American Society for Pharmacology & Experimental Therapeutics and the Society of Toxicology.]

79-0444. End. D. W.; Carchman, R. A.; Dewey, W. L. (Med. Coll. Virginia, Richmond, VA 23298) **Assessment of the neurotoxicity of Kepone *in vitro.*** *Pharmacologist* 3(2): 188; 1978.

Kepone (chlordecone) at 0.01 μM and 1.0 μM concentrations greatly inhibited synpatosomal calcium ion exchange and potassium depolarized synaptosomes prepared from rat brain. The depolarization- evoked release of dopamine was inhibited by a 10 μM concentration of Kepone. Concentrations of 1.0 μM to 10 μM caused an amphetamine-like stimulation of serotonin release. A dose of Kepone of 40 mg/kg, po at 18 hr before sacrifice, produced no effects on the above parameters, but did cause a 50% inhibition of succinate-stimulated mitochondrial uptake of calcium ions. Thus a disruption of mitochondrial respiration and/or transport functions may be the cause of the neurotoxicity due to Kepone. [At the 1978 joint meeting of the American Society for Pharmacology & Experimental Therapeutics and the Society of Toxicology.]

79-0445. Crookshank, H. R.; Sowa, B. A.; Kubena, L.; Holman, G. M.; Smalley, H. E.; Morison, R. (Agric. Res. Serv., USDA, College Station, TX 77840) **Effect of diflubenzuron (Dimilin; TH-6040) on the hyaluronic acid concentration in chicken combs.** *Poult. Sci.* 57(3): 804-806; 1978. (5 references)

The effects of diflubenzuron (Dimilin; TH-6040) on hyaluronic acid (HA) formation in the combs and wattles of chickens was studied. Twenty-eight day old male chicks were fed a diet containing 0, 2.5, 25, or 250 ppm diflubenzuron. At 21, 28, 42, 56, and 98 days, chickens were sacrificed and the combs were analyzed for HA. Concentrations of HA increased as birds matured and became heavier. Results showed, however, no effect of diflubenzuron on HA deposition in the comb.

79-0446. Klekowski, R. Z.; Korde, B.; Kaniewska-prus, M. (Dep. Ecol. Bioenerg., Inst. Ecol., Polish Acad. Sci., P-05150 Lomianki, Poland) **The effect of sodium salt of 2,4-D on oxygen consumption of *Misgurnus fossilis* L. during early embryonal development.** *Pol. Arch. Hydrobiol.* 24(3): 413-421; 1977. (30 references)

Changes in oxygen requirement during early embryogenesis in *Misgurnus fossilis* L., in the presence of sodium salt of 2,4-D, were investigated. The study demonstrated that the 2,4-D sodium salt exerts no effect on the oxygen consumption in the initial phase of embryogenesis which lasts until the 6th hr. This indicates that at this stage of development the energy supply is not only related to oxidative phosphorylation, but is to a large extent, due to glycolysis. After the 9th hr, there was a decrease in oxygen consumption in variant II as well as an inhibition of this rise in variant III after 7 hr. This is perhaps caused by an inhibitory effect of 2,4-D sodium salt on the bioenergetic process, that is, on the oxidative phosphorylatin in the mitochondria during early embryogenesis. The oxygen consumption was markedly decreased in all variants after the 9th hr of development, perhaps due to the critical period at the blastula stage and at the beginning of gastrulation. The level of herbicide solution used in these studies was 15 m*M*.

79-0447. Nigg, H. N. (Inst. Food & Agric. Sci., Agric. Res. & Educ. Cent., Univ. Florida, Lake Alfred, FL 33850) **Worker reentry in Florida citrus: comparison of two pesticide residue techniques for citrus foliage.** *Proc. Fla. State Hortic. Soc.* 90: 21-23; 1977. (9 references)

In order to determine if conditions in orchards are safe enough for worker reentry after the application of pesticides, it is useful to know the level of pesticide residues remaining on leaf surfaces at given time intervals after spraying. Foliage of valencia trees was treated with four applications of parathion in either a wettable powder (2.28 kg/379 L) or an emulsifiable concentrate (25% parathion). Sixty leaf samples were vacuumed and the pesticide-laden particulate matter was collected by two different filter techniques: a Millipore 50 μ, and a GF/A 1.6 glass fiber filter. Unvacuumed leaf samples were also collected by the leaf-punch method and 40 samples were analyzed for total dislodgeable surface residues of pesticides. Use of the two different filters in the vacuum removal gave significantly different results. The difference appeared to be related to the flow rate of the 50 μ filter which was 2250 fpm, as compared to the glass fiber filter which was 5000 fpm. The amount of parathion and paraoxon residues obtained by vacuuming was 5.3 to 27 times less than that obtained with dislodgeable techniques. It is suggested that the dislodgeable technique is more consistent and provides a better assessment of the time at which workers can safely reenter the field after pesticide applications.

79-0448. Saxena, S. C.; Bakre, P. P. (Toxicol. Lab., Dep. Zool., Univ. Rajasthan, Jaipur 302004, India) **Toxicity of pyrethrum to Blue Rock pigeon.** *Pyrethrum Post* 14(2): 47-48; 1978. (4 references)

Blue Rock pigeons were captured and treated with doses of 10, 20, 30, 40, and 50 mg/kg of pyrethrum extract im in the thigh region. Birds were given a single dose, and were autopsied 7 days after treatment. A tendency was noted among the treated birds to group together in the corner of the cages. This was followed by periods of hyperexcitability. A slight sickness was the only sign of illness and this was present only in the birds treated with 50 mg/kg. No mortality was noted. Reduced food consumption was noted, and attributed to an effect on the safety canters of the birds. A slight increase was noted in organ weights in this study. However, this increase may be related to edema as a response to pyrethrum entry into various systems.

79-0449. Zawadzka, T. (Res. Inst. Food & Commod., Natl. Inst. Hyg., P-00791 Warsaw, Poland) **Wplyw wy-**

branych pestycydow na aktywnsc dehydratazy weglowanej *in vivo* II. Badania aktywnosci enzymu i poziomu Zn i Cu we krwi szczurow po podaniu preparatox zinebu. [Effects of selected pesticides on carbonate dehydratase activity *in vivo* . II. Determinations of enzyme activity and zinc and copper levels in rat blood after administration of zineb preparations.] *Rocz. Panstw. Zakl. Hig.* 28(6): 595-600; 1977. (20 references) (Polish)

The effects of zineb (Cynkotox) and zinc cuprate (0.1 of LD50), as well as of cuprate (195 mg/kg, equivalent to the amount of copper in the zinc-cuprate preparation) on the carbonic anhydrase activity and on the zinc and copper levels of the blood were studied in rats 2-5 hr after poisoning with single doses. Zineb and cuprate significantly inhibited the carbonic anhydrase activity compared with the controls. Zineb increased the blood zinc level, and cuprate increased the copper level in the blood. Zinc cuprate caused no change in the enzyme activity, nor in the copper and zinc levels in the blood, which is explained by the antagonism of Zn and Cu metabolism during absorption.

79-0450. Goodwin, N.; Bach, F.; Wingfield, S. E. (Intensive Care Unit, Addington Hosp., Durban, South Africa) **Cholinesterase-inhibiting pesticides.** *S. Afr. Med. J.* 54(16): 637; 1978. (3 references)

In this letter to the editor the author advises against the regular use of the currently available oxime cholinesterase reactivators, pralidoxime or obidoxime, in cases of poisoning due to organophosphates. It is noted that although these reactivators are useful against some of the organophosphates, they can lead to rapid deterioration in the condition of patients with carbaryl poisoning. Carbaryl poisoning symptoms also include a lowering of the cholinesterase activity. It is urged that, when possible, determination of the specific compound which caused the illness of the patient be identified before therapy is begun.

79-0451. Reuber, M. D. (Frederick Canc. Res. Cent., NCI, Frederick, MD 21701) **Carcinogenicity testing of chemicals with particular reference to organochlorine pesticides.** *Sci. Total Environ.* 10(2): 105-115; 1978. (66 references)

Testing of various pesticides has indicated that organochlorines given to mice in their diets are carcinogenic, causing hepatic tumors which are malignant, invading and metastasizing. These tumors grow after transplantation to isologous hosts. When dieldrin was given in the diet significant numbers of malignant tumors were formed at every dose tested, including the lowest dose of 0.1 ppm. Carcinomas and sarcomas were also produced by organochlorine pesticides in other organs at doses as low as 0.5, 1 or 2 ppm. Hyperplasia as well as hyperplastic nodules and occasional cirrhosis and carcinomas of the liver were also formed. At high doses, organochlorines caused considerable acute and chronic liver and kidney injury in rats. Necrosis of the liver and kidneys or chronic nephritis not only resulted in death of rats, but also interfered with carcinomas and sarcomas in their development stages. No morphological or biological differences were found between the carcinomas of the liver and other organs and sarcomas observed in mice and rats when compared to similar tumors in humans. It is suggested that there is sufficient documentation to support the qualitative extrapolation of animal data to humans.

79-0452. Silver, E. H.; Murphy, S. D. (Dep. Physiol., Kresge Cent. Environ. Health, Harvard Sch. Public Health, Boston, MA 02115) **Effect of carboxylesterase inhibitors on the acute hepatotoxicity of esters of allyl alcohol.** *Toxicol. Appl. Pharmacol.* 45(2): 377-389; 1978. (18 references)

Inhibitors of carboxylesterases were used to determine the importance of enzymatic hydrolysis in the production of liver injury by esters of allyl alcohol. Hydrolysis of the esters allyl acetate, allyl cinnamate, and allyl phenoxyacetate by homogenates of liver from rats treated with 125 mg/kg triorthotolyl phosphate (TOTP) was almost completely inhibited compared to that of control livers. Allyl acetate, allyl cinnamate, and allyl phenoxyacetate were administered orally to rats 18 hr after pretreatment with 125 mg/kg TOTP or 0.5 to 10 mg/kg of the defoliant *S,S,S*-tributylphosphorotrithioate (DEF). TOTP pretreatment significantly inhibited the rise in plasma alanine-α-ketoglutarate transaminase (AKT) activity and prevented changes in liver morphology produced by 60 to 150 mg/kg allyl acetate. DEF pretreatment protected against the hepatotoxicity of 60 mg/kg allyl acetate. This protective effect was maximal after treatment with 1 mg/kg DEF, which inhibited liver esterase 56%. TOTP prevented the elevation of plasma AKT activity induced by 250, 400, or 600 mg/kg allyl cinnamate. TOTP exerted only a slight protective effect against allyl phenoxyacetate hepatic necrosis, in that it prevented the injury produced by 200 mg/kg but not that produced by 250 or 400 mg/kg allyl phenoxyacetate. Pretreatment of rats with 375 mg/kg pyrazole, an inhibitor of alcohol dehydrogenase, completely prevented the elevation of plasma AKT activity after 90 mg/kg allyl acetate or 250 mg/kg allyl cinnamate. These studies demonstrate that, while it is likely that all three allyl esters share a common mechanism of hepatotoxic action, enzymatic hydrolysis is a necessary step in the activation of allyl acetate and allyl cinnamate to hepatotoxins but is less important in the activation of allyl phenoxyacetate. (Author abstract by permission)

79-0453. Guiney, P. D.; Yang, K. H.; Seymour, J. L.; Peterson, R. E. (Prof. & Regul. Serv., Div. Proctor & Gamble Co., Cincinnati, OH) **Effects of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin on the distribution and biliary excretion of polychlorinated biphenyls in rats.** *Toxicol. Appl. Pharmacol.* 45(2): 403-414; 1978. (26 references)

Plasma disappearance, biliary excretion, and tissue distribution of two polychlorinated biphenyls (PCB's), 2,5,2′,5′- [^{3}H]tetrachlorobiphenyl (4-CB) and 2,4,5,2′,4′,5′- [^{3}H]hexachlorobiphenyl (6-CB), was determined in rats 10 days after oral administration of a single 10 or 25 μg/kg dose of 2,3,7,8- tetrachlorodibenzo-*p*-dioxin (TCDD). Plasma

disappearance of both PCB's was not altered by TCDD treatment, but biliary excretion was depressed. Associated with the depressed excretion was a reduction in bile flow and concentration of 4-CB- and 6-CB-derived ^{3}H in bile. Treatment with TCDD resulted in less PCB being distributed to the skin and a greater percentage of the dose being accumulated in the liver. The content of PCB-derived ^{3}H in skeletal muscle, adipose tissue, and urine was similar in control and TCDD-treated rats. Extraction of bile with hexane showed that the majority of biliary radioactivity was in the form of polar metabolites and that the proportion of parent PCB (hexane-extractable radioactivity) to polar metabilites of radioactivity in the liver was hexane extractable, and the smaller amount of hepatic radioactivity due to polar 4-CB metabolites was greater in the TCDD treatment group than in the control group. When biliary metabolites of 4-CB were administered, biliary excretion of the metabolites was depressed in TCDD-treated animals. Thus, TCDD treatment impairs the initial and main excretory pathways for PCB elimination in the rat-biliary excretion-and alters the distribution of PCBs to the skin and liver. (Author abstract by permission)

79-0454. Khera, K. S.; Whalen, C.; Trivett, G. (Bur. Chem. Safety, Food Direct., Health Prot. Branch, Ottawa, K1A OL2, Canada) **Teratogenicity studies on linuron, malathion, and methoxychlor in rats.** *Toxicol. Appl. Pharmacol.* 45(2): 435-444; 1978. (26 references)

Technical grades of linuron, malathion, and methoxychlor, and formulations of linuron and methoxychlor, were given to bred rats by gastric intubation on days 6 to 15 of gestation. Dams were killed on the 22nd day of gestation, and fetuses were evaluated by routine teratologic methods. Technical grades of linuron at doses as high as 100 mg/kg, technical grades of malathion at doses as high as 300 mg/kg and formulations of linuron, from one supplier, at doses as high as 200 mg/kg were not teratogenic. Formulations of linuron from another supplier were teratogenic at 200 mg/kg, but not at 100 mg/kg. Treatment with methoxychlor (technical grade or formulation) was associated with reduced maternal body weight gain during gestation at all test doses ranging from 50 to 400 mg/kg. Both methoxychlor samples were fetotoxic at 200 and 400 mg/kg, and both produced a dose-related increase in the incidence of wavy ribs at 100, 200, and 400 mg/kg/day. (Author abstract by permission)

79-0455. Magos, L.; Peristianis, G. C.; Snowden, R. T. (MCR Toxicol. Univ., Med. Res. Counc. Lab., Carshalton, Surrey, SM5 4EF, England) **Postexposure preventive treatment of methylmercury intoxication in rats with dimercaptosuccinic acid.** *Toxicol. Appl. Pharmacol.* 45(2): 463-475; 1978.

Male rats of approximately 200 g body weight were given by gavage six daily doses of 8.0 mg of Hg/kg as $Me^{203}HgCl$ with 2 days omission between the fourth and fifth doses. After five or six doses there was a progressive loss of body weight, followed by granule cells necrosis in the cerebellum and functional disturbances (flailing reflex when animal is held loosely under the forelimbs and crossing of hind legs when animal is held by the tail). Three days of treatment with dimercaptosuccinic acid (DMSA) (75 mg of DMSA/30 ml of drinking water/day/animal) commencing at 1 to 5 days after the last $Me^{203}HgCl$ dose decreased both body burden and the brain contents of ^{203}Hg by 60%, reversed loss of body weight, prevented the progression of cerebellar damage, and caused even some improvement in flailing reflex and hind leg crossing. As the brain content of methylmercury reached a maximum between 1 to 3 days, the present experiments indicate that the maximum concentration of methylmercury in the CNS is not the only factor which determines the outcome of methylmercury intoxication; the pattern of methylmercury accumulation and depletion is also an important factor. (Author abstract by permission)

79-0456. Beatty, P. W.; Vaughn, W. K.; Neal, R. A. (Cent. Environ. Toxicol., Dep. Biochem., Vanderbilt Univ. Sch. Med., Nashville, TN 37232) **Effect of alteration of rat hepatic mixed-function oxidase (MFO) activity on the toxicity of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD).** *Toxicol. Appl. Pharmacol.* 45(2): 513-519; 1978. (25 references)

The effect of alteration of the activity of the hepatic mixed-function oxidase (MFO) enzyme systems on the toxicity of 2,3,7,8- tetrachlorodibenzo-*p*-dioxin (TCDD) in rats has been examined. These experiments have indicated the naturally occurring age and sex-related differences in hepatic MFO activity in rats are inversely correlated with the 20-day LD50 of TCDD in these animals. The effect of administering inducers and inhibitors of the hepatic MFO enzyme systems on the 20-day LD50 of TCDD in rats has also been examined. In all cases there was an inverse relationship between the activity of the hepatic MFO system at the time of TCDD administration and the toxicity of TCDD as determined by the 20-day LD50. (Author abstract by permission)

79-0457. Konno, N.; Kinebuchi, H. (Dep. Public Health, Fukushima Med. Coll., Fukushima, Japan) **Residues of phosvel in plasma and in adipose tissues of hens after single oral administration.** *Toxicol. Appl. Pharmacol.* 45(2): 541-547; 1978. (17 references)

In the first study, hens (24 mo old) were sacrified at various time intervals after a single oral dose of 50 or 250 mg/kg of Phosvel (leptophos), *O*-(4-bromo- 2,5-dichlorophenyl)- *O*-methylphenyl phosphonothioate. At both doses, the Phosvel concentration in plasma reached a maximum within 3 hr and then declined rapidly; after 72 hr no residues were detectable. The concentration of Phosvel in fat attained a peak after 12 hr in both groups and was closely related to dose. The elimination of Phosvel from the fat was very slow. In the second study, younger (6 mo old) and older (21 mo old) hens were given a single oral dose of 250 mg/kg of the pesticide and were sacrificed after 1, 3, 7, 14, 21, and 28 days. Phosvel was detected in the fat of one of the older birds 28 days after treatment. The mean values of Phosvel in fat decayed logarithmically and biological half-life was 1.5 days

for the younger birds and 4.9 days for the older birds. (Author abstract by permission)

79-0458. Popp, J. A.; Shinozuka, H.; Farber, E. (Fels Res. Inst., Temple Univ. Sch. Med., Philadelphia PA 19140) **The protective effects of diethyldithiocarbamate and cycloheximide on the multiple hepatic lesions induced by carbon tetrachloride in the rat.** *Toxicol. Appl. Pharmacol.* 45(2): 549-564; 1978. (43 references)

Carbon tetrachloride-induced liver lesions in rats were studied by light and electron microscopy in relation to time and dose of administered CCl_4 and as modified by treatment with diethyldithiocarbamate (DEDTC) or cyclohexamide (CH) at different times before or after CCl_4. DEDTC prevented CCl_4-induced collapse of the membranes of the endoplasmic reticulum and necrosis in zone 3 (centrilobular). DEDTC did not prevent endoplasmic reticulum dilatation (balloon cell formation) but induced a shift in its location from zones 1 and 2 to zone 3. A similar location of balloon cells with only a rare necrotic cell was seen with very low doses of CCL_4 (2.5 to 5 μl/kg). Balloon cell formation did not precede the appearance of zone 3 necrosis with any dose of CCl_4. CH delayed the induction of CCl_4-induced necrosis for 1 day, but the development of membrane lesions in the endoplasmic reticulum was unaffected. Fatty change (steatosis) was present in all three zones and was decreased but not prevented by pretreatment with either DEDTC or CH. The evidence supports the concept that liver injury induced by CCl_4 is a composite of at least three lesions; necrosis, balloon cell formation, and steatosis. Study of these three discrete lesions may help in defining the mechanism by which CCl_4 damages the liver. (Author abstract by permission)

79-0459. Davies, D. B.; Holub, B. J. (Dep. Nutr., Univ. Guelph, Guelph, Ont. N1G 2W1, Canada) **Comparative effects of dietary parathion on the activities of cholinesterase and lecithin: cholesterol acyltransferase in rat plasma.** *Toxicol. Appl. Pharmacol.* 45(2): 641-645; 1978. (14 references)

Adult female rats were fed either a control diet or diets containing parathion at varying concentrations for 11 days. Body weights and daily feed intake of animals administered parathion at levels less than 20 ppm were not modified during feeding trials by comparisons with controls. Plasma cholinesterase activities were significantly reduced from control values for all dietary levels of the pesticide used (4-20 ppm). No significant alteration of the concentration of free cholesterol or lecithin:cholesterol acyltransferase activity in plasma was observed when parathion was fed. Plasma lecithin:cholesterol acyltransferase was judged to be a much less sensitive biochemical marker of *in vivo* parathion toxicity than plasma cholinesterase. (Author abstract by permission)

79-0460. Abou-Donia, M. B.; Graham, D. G. (Dep. Pharmacol. & Pathol., Duke Univ. Med. Cent., Durham, NC 27710) **Delayed neurotoxicity of *O*-ethyl *O*-4- nitrophenyl phenylphosphonothioate: subchronic (90 days) oral administration in hens.** *Toxicol. Appl. Pharmacol.* 45(3): 685-700; 1978. (22 references)

Delayed neurotoxicity in hens was produced following daily oral administration of 0.1, 0.5, 1.0, 2.5, 5.0, and 10.0 mg/kg of technical (85%) *O*-ethyl *O*-4-nitrophenyl phenyl phosphonothioate (EPN) in gelatin capsules for 90 days. Daily, three groups of hens were given empty gelatin capsules, 10 mg/kg of tri-*o*-cresyl phosphate (TOCP), or 1 mg/kg of parathion (*O,O*-diethyl *O*-4-nitrophenyl phenyl phosphorothioate) and served as gelatin capsule controls, positive controls, and negative controls, respectively. TOCP-treated hens developed delayed neurotoxicity, and those given parathion showed leg weakness with subsequent recovery when the administration of this agent had stopped. The clinical condition of most ataxic hens deteriorated during the 30-day observation period following the end of the oral administration of EPN. Severity of the clinical condition depended on the size of the daily ingested dose, i.e., while hens given small doses showed only ataxia, those treated with large doses progressed to paralysis and died. Days of administration and "total administered dose" before onset of ataxia depended on the daily dose. Degeneration of myelin and axons in the spinal cord was the most consistent histologic change and was identical to that found in TOCP control hens. Only one hen showed sciatic nerve degeneration. Livers from two hens given the highest dose of EPN manifested a moderate degree of hemosiderosis. Plasma cholinesterase was significantly inhibited in all surviving hens given EPN or TOCP at the end of the observation period. A group of hens treated daily with 0.01 mg/kg of EPN showed no abnormality in gait or behavior, and its plasma cholinesterase activity was not significantly different from that of the control. Hens treated with parathion had plasma cholinesterase activity comparable to that of control 30 days after the administration of the last dose. (Author abstract by permission)

79-0461. Koschier, F. J.; Girard, P. R.; Hong, S. K. (Dep. Physiol., Sch. Med., State Univ. New York, Buffalo, NY 14214) **Transport of 2,4-dichlorophenoxyacetate by rat renal cortical slices.** *Toxicol. Appl. Pharmacol.* 45(3): 883-894; 1978. (30 references)

The herbicide, 2,4-dichlorophenoxy acetate (2,4-D), has been shown previously to be accumulated by renal cortical slices in a manner similar to *p*-aminohippurate (PAH). To characterize further the mechanism of 2,4-D transport, the efflux of 2,4-D from preloaded renal slices was studied. The efflux curve for 2,4-D had a fast ($k = 0.254$/min) and a slow ($k = 0.016$/min) component. Both rate constants are increased by certain competitive inhibitors and metabolic inhibitors (probenecid, 2,4-dinitrophenol, and iodoacetamide). Unlike PAH efflux, no biphasic response was noted with increasing concentrations of probenecid. SITS, another competitive inhibitor, increased only the slow efflux component. The efflux of 2,4-D into a $Ca^{2}+$-free medium was unaltered; however, when a $K+$-free medium was used, the slow component was increased. As with PAH efflux, the slow component of 2,4-D efflux was decreased in the presence of lactate, but this effect was not noted for the fast phase which was

increased. The slow component was unaltered when the temperature was decreased from 25 to 15°C, although the rate was increased when the temperature was changed from 25 to 35°C. The rate of the fast component was moderately greater at 15 and 35°C than that at 25°C. The rate of initial influx of 2,4-D when compared to 2,4-D efflux was rapid enough to account for the fact that this compound, at low media concentrations, continues to be concentrated within the tissue and does not exhibit a steady state level of transport. Moreover, this herbicide is an extremely potent inhibitor of the organic anion system since a concentration of approximately 20 μM 2,4-D produced a 50% inhibition of PAH transport. These results gave a further indication that the renal transport of 2,4-D has characteristics different from PAH. Such differences appear to be consistent with the *in vivo* excretion pattern of this herbicide. (Author abstract by permission)

79-0462. Warren, R. J.; Kirkpatrick, R. L. (Dep. Fish. & Wildl. Sci., Virginia Polytech. Inst., Blacksburg, VA 24061) **Reproduction in female cottontail rabbits as influenced by mirex ingestion and nutritional restriction.** *Virginia J. Sci.* 27(2): 51; 1978.

Mirex was administered at 20 ppm as part of a diet to 29 female cottontail rabbits (*Sylyilagus floridanus*). The rabbits were fed at a 25% nutrient restriction. The rabbits were contained in single cages during the 8 wk treatment period and then released to an outdoor enclosure with 16 males for a 3 week period. At the time the rabbits were outside, treatment with mirex was discontinued. Reproductive characteristics were not affected by the mirex treatment. However, the nutrient restiction did lower the number of females which ovulated and became pregnant, reducing this number from 80% to 18%. The number of fetuses per pregnant female were also significantly lower in the feed-restricted group than in the control group. Restricted rabbits also had significantly lighter ovarian weights than *ad libitum* rabbits.

79-0463. Smith, E. A.; Mayfield, C. I. (Dep. Biol., Univ. Waterloo, Waterloo, Ont. N2L 3Gl, Canada) **Paraquat: determination, degradation, and mobility in soil.** *Water Air Soil Pollut* 9(4): 439-452; 1978. (49 references)

A rapid and sensitive procedure is described for recovering low levels of paraquat from small soil samples. Two types of soil were studied, one a sandy loam soil, and the other a sandy clay loam soil. When applied to the sandy loam soil at 0.56 to 2.24 kg/ha, which is the field application rate normally used, paraquat remained in the top 1 cm of soil. Organic matter, non-expanding and expanding-lattice clays readily adsorbed the paraquat, and this adsorption process was not readily affected by soil pH but was influenced by porosity, moisture content, residence time and adsorption capacity of the soil. The mobility of the herbicide was reduced by the strong attraction of paraquat to soil constituents. However, the compound was displaced from binding sites by low concentrations, of cations including ammonium, potassium, sodium, and calcium ions. The absorptive capacity of the soil affected the desorption process and the kind and concentration of desorbing cations. The method for analysis called for the release of the paraquat from the soil by a hot-plate and acid-digestion procedure. Recovery involved the use of a modification of an ion-exchange method. During incubation periods as long as 16 mo at 25°C, the herbicide was not degraded chemically or microbiologically in soil to any significant degree.

79-0464. Canton, J. H.; Wegman, R. C. C.; Vulto, T. J. A.; Verhoef, C. H.; Van Esch, G. J. (Lab. Toxicol., National Inst. Public Health, Bilthoven, The Netherlands) **Toxicity, accumulation- and elimination studies of α-hexachloro cyclohexane (α-HCH) with saltwater organisms of different trophic levels.** *Water Res.* 12(9): 687-690; 1978. (8 references)

Alga, crustacea, and fish (guppies) were exposed to α-HCH (BHC) in saltwater at levels of 0.01, 0.05, 0.14, and 0.25 mg/l α-HCH. No influence was noted on the growth of *Dunaliella* within 2 or 4 days. The LC50 value at 4 days for *Artemia* was slightly lower than the EC50 value at 2 days for *Daphnia* and the EC50 for *Lebistes* (saltwater) was slightly higher than that for *Lebistes* (freshwater). Concentration factors for guppy acclimated to saltwater were about three times (on lipid basis about four times) higher than those found in guppy exposed to comparable α-HCH concentrations in freshwater. The lipid content of *Artemia* was lower than that of *Lebistes* acclimated to saltwater. It was concluded that there exists very little difference in sensitivity for α -HCH between the tested saltwater and freshwater organisms of comparable trophic levels.

79-0465. Guttowa, A. (Inst. Parasitol., Polish Acad. Sci., Warsaw, Poland) **The influence of chemical contamination of the natural environment on the parasitological organisms.** *Wiad. Parazytol.* 22(4-5): 423-428; 1976.

The effects in increased usage and the contamination of the environment by these chemicals on parasitological organisms are reviewed. Larval forms of helminths are found in many water and land ecosystems and play significant roles in regulation and selection of host populations. Low level concentrations of chlorinated pesticides generally affect the helminthic F_1 generation by a significant reduction on the hatching processes as well as decreasing the overall metabolic rates, increasing oxygen consumption and respiration rates and decreasing biocatalytic activity. Discussion of actions of some organophosphate, carbamate and phenoxy acid pesticides is given.

79-0466. Hutson, D. H.; Casida, J. E. (Shell Toixicol. Lab., Shell Res. Ltd., Sittinbourne, Kent ME9 8AG, England) **Taurine conjugation in metabolism of 3-phenoxybenzoic acid and the pyrethroid insecticide cypermethrin in mouse.** *Xenobiotica* 8(9): 565-571; 1978. (16 references)

A substantial proportion of the radioactivity of an oral dose (1-20 mg/kg) of 3-phenoxy [^{14}C]benzoic acid and

the pyrethroid insecticide *trans* and *cis*-[*aryl*-^{14}C]cypermethrin (an α-cyano- 3-phenoxybenzyl ester) is eliminated rapidly in urine of mice. The major urinary metabolite of these compounds in two strains of mice is *N*- (3-phenoxy benzoyl) taurine. Neither 3-phenoxybenzoic acid nor cypermethrin gives a taurine conjugate in rats. Benzoic acid gives no taurine conjugation in mice. (Author abstract by permission)

79-0467. Schulten, H. R.; Lehmann, W. D.; Ziskoven, R. (Inst. Phys. Chem., Univ. Bonn, Bonn, BRD) **Determination of thallium in brain tissue by stable isotope dilution and field desorption mass spectrometry.** *Z. Naturforsch. Teil C* 33(7-8): 484-487; 1978. (15 references)

A mouse was given cheese containing 80 mg thallium chloride. Field desorption mass spectrometry was used to perform the determination of thallium in brain tissue from the expired animal. Stable isotope dilution and accumulation of the electrically recorded field desorption ion currents with a multi-channel analyzer allowed a direct estimation of thallium in the homogenized tissue samples with no further pretreatment required. The study demonstrated the reliability, sensitivity, and speed of the method for thallium determinations in biological samples. The sensitivity of the method is about the same as for alkali metals, which thus enables the determination of trace ans ultratrace quantities to be made.

See also 79-0254, 79-0261, *and* 79-0472.

79-0468. Repetto, M.; Sanz, P. (Inst. Nacl. Toxicol., Seville, Spain.) **Toxicological herbicide detection by antibiogram method.** *Acta Pharmacol. Toxicol. Suppl.* 41(2): 229; 1977.

A technique based on the agar diffusion method for antibiotic assay is described for detecting herbicides in water, foods, and in blood or viscera of an intoxicated animal or person. Small Whatman discs are applied on an agar plate inoculated with micro-algae, *Chlorella* or *Chlamydomonas*. The discs are impregnated with suspect samples or homogenates. Plates are then incubated in light at room temperature, and growth inhibition zones are noted.

79-0469. Simonet, D. E.; Knausenberger, W. I.; Townsend, L. H., Jr.; Turner, E. C., Jr. (Dep. Entomol., Virginia Polytech. Inst. & State Univ., Blacksburg, VA 24061) **A biomonitoring procedure utilizing negative phototaxis of first instar *Aedes aegypti* larvae.** *Arch. Environ. Contam. Toxicol.* 7(3): 339-347; 1978. (33 references)

Negative phototaxis of newly hatched *Aedes aegypti* L. larvae was inhibited by exposure to three heavy metals and five organic insecticides. This response was quantified in an inexpensive multiunit apparatus consisting of four glass troughs perpendicular to a uniform light source. The criterion of toxic effect, established with cupric sulfate as a standard, was: inability of larvae to migrate 30 cm in 60 sec after 8 hr of pre-exposure, designated as 8-hr EC50. The photomigration procedure was more sensitive than our comparative 24-hr acute lethal toxicity tests on metals. The 8-hr EC50 values for cadmium, chromium and copper were 0.6, 2.4, and 1.4 mg/l, respectively. Values for insecticides ranged from 0.003 mg/l for fenitrothion (organophosphate) to 0.39 mg/l for methomyl (carbamate). (Author abstract by permission)

79-0470. Lembas, J. (Dep. Chem. Toxicol., Acad. Med., Wroclaw, Poland) **Wartosc substratu 1-naftylooctanu w oznaczaniu aktywnosci cholinoesteraz i ich frakcji elektroforetycznych w badaniach toksykologicznych. [Appraisal of 1-nahpthyl acetate as a substrate in determination of cholinesterase activities and their electrophoretic fractions in toxicological studies.]** *Bromatol. Chem. Toksykol.* 10(4): 383-388; 1977. (16 references) (Polish)

Cholinesterase activities were measured in biological materials (homogenates and hemolysates) using 1-naphthyl acetate and acetylcholine as substrates. The specificity of 1-naphthyl acetate was also examined using 1-naphthyl acetate and actylcholine as substrates. The estimation of the specificity of 1-naphthyl acetate was based on the Michaelis constant and physostigmine inhibition. Electrophoretic studies were also conducted on the enzymatic activity developed against 1-naphthyl acetate and acetylthiocholine. It was concluded based on these studies that 1-naphthyl acetate cannot be used as a substrate in studies on cholinesterase activity in biological fluids and homogenates rich in acetylcholinesterase. It was also judged unsuitable for use in measurement of enzyme inhibition by toxic agents.

79-0471. Semonian, B. P. (Univ. Georgia, Athens, GA 30601) **A study of the chromatographic behavior of a high pressure pentane-vapor mobile phase and a nitrogen- phosphorus- specific gas chromatographic detector.** *Diss. Abstr. Int. B.* 38(11): 5322-5323; 1978.

n-Pentane vapor has been used as a mobile phase in high pressure gas chromatography to separate some polynuclear aromatic hydrocarbons at both sub- and super- critical temperatures. Short columns (3.8 and 15.2 cm) were employed to reduce effects of column pressure-drop. Column efficiencies were very high, with HETP values of 0.2 to 0.4 mm. Contrary to theory, column efficiency appeared to be independent of pressure, a result attributed to a pressure-induced, infinite-diameter column effect. Maxima in plots of the distribution ratio *vs* column pressure were related to pressure-dependent physicial and chemical effects. Increases in column temperature resulted in decreases in the distribution ratio for all pressures tested. In the phosphorus mode, a thermionic rubidium silicate detector gave a response 0.002 C/g for azobenzene, revealing an unexpectedly high sensitivity toward a nitrogen-containing compound. Depending upon detector conditions, the detector could be made from 15 to 120 times more sensitive for malathion, a phosphorus-containing compound, than for azobenzene. Sharp maxima in sensitivity were exhibited at total detector gas flows of approximately 70 ml/min. For the insecticides Dursban (chlorpyrifos), diazinon and methyl parathion, each of which contained both phosphorus and nitrogen, the predominant contributor to the overall response appeared to be the phosphorus moiety. Detectabilities of 4-7 pg/sec were typical for azobenzene and malathion, respectively, in the N-P mode. In the phosphorous mode, the corresponding detectabilities were 2-890 pg/sec 0.1-12 pg/sec. (Author abstract by permission. Copies of the thesis are available from University Microfilms, order No. 7806038.)

79-0472. Arjmand, M. (Pennsylvania State Univ., University Park, PA 16802) **Identification, characterization, analytical techniques and biological activity of amino acid conjugates of chlorophenoxy herbicides.** *Diss. Abstr. Int. B* 39(2): 540; 1978.

Chlorophenoxy compounds also called phenoxyalkanoic acids, are plant growth regulators. These compounds are widely used as selective herbicides for killing unwanted plants. Despite intensive studies on the metabolism of 2,4-dichloro phenoxyacetic acid (2,4-D) by plants, techniques for analysis of its metabolites have not been developed. The first part of this thesis reports on the development of analytical techniques for analysis of 2,4-D metabolites, with emphasis on the amino acid conjugates. A gas liquid chromatographic procedure was developed for the anlaysis of the methyl ester derivatives of the metabolites, employing OV-1 and OV-17 columns. A high-pressure liquid chromatographic technique was also developed for the analysis of the 2,4-D amino acid conjugates. This technique utilizes paired-ion chromatography and a μ Bondapak C_{18} column with a methanol-water solvent. The second part of this thesis involves ingestigations on the fate of 2,4,5-trichloro phenoxyacetic

acid (2,4,5-T) in plant tissues culture. Amino acid conjugates of 2,4,5-T were synthesized, purified and their methyl ester derivatives were characterized by gas-liquid chromatography and mass spectrometry. Metabolism studies were conducted in soybean cotyledon callus tissue culture using 2,4,5-T 1-^{14}C. The major metabolites of 2,4,5-T were found to be 2,4,5-T glutamic acid and 2,4,5-T aspartic acid. Two types of tests were conducted to evaluate the biological activity of 2,4,5-T amino acid conjugates. Concentrations of 100 μM to 10nM of the conjugates were examined. Most of the conjugates stimulated cell elongation in the *Avena* test. In the soybean root callus tissue culture test very poor activity of the conjugates were observed except for 2,4,5-T Met at 10 μM and 2,4,5-T Val at 1 μM. (Author abstract by permission. Copies of the thesis are available from University Microfilms, order No. 7812030.)

79-0473. Caro, J. H.; Bierl, B. A.; Freeman, H. P.; Sonnet, P. E. (Agric. Eviron. Qual. Inst., Beltsville Agric. Res. Centr., USDA, Beltsville, MD 20705) **A method for trapping disparlure from air and its determination by electron-capture gas chromatography.** *J. Agric. Food Chem.* 26(2): 461-463; 1978. (7 references)

An efficient and sensitive method has been developed for determination of airborne concentrations of disparlure (*cis*-7,8- epoxy-2- methyl octadecane), the gypsy moth [*Lymantria dispar* (L).] sex attractant. Disparlure is collected by drawing a measured volume of air through a bed of type 4A molecular sieves. For quantitative analysis, the sieves are extracted with 1:1 hexane:ether, and the disparlure in the extract is derivatized with triphenylphosine dibromide. After cleanup with activated Florisil, the brominated product is determined by electron-capture gas chromatography. The method yields recoveries of 80% or more over a wide range of concentrations. It has been successfully applied in the field to disparlure air concentrations as low as 0.2 ng/m^3. (Author abstract reprinted by permission of the American Chemical Society).

79-0474. Newsome, W. H. (Food Res. Div., Bur. Chem. Saf., Food Dir., Health & Welfare Canada, Ottawa, Ont. K1A 0L2, Canada) **A method for the determination of ethyleneurea in foods as the pentafluorobenzamide.** *J. Agric. Food Chem.* 26(6): 1325-137; 1978. (16 references)

A method was developed for the determination of ethyleneurea in foods at levels of from 0.01 to 5 ppm. Residues were extracted with acetone and the extract alkylated to remove ethylenethiourea (ETU). After partial cleanup on alumina, ethyleneurea was pentafluorobenzoylated and the product purified on a column of silica acid. Quantitation of the pentafluorobenzamide was carried out by high-pressure liquid chromatography with confirmation by GLC and mass spectrometry. Recoveries from five commodities were generally greater than 80%. The method was unaffected by zineb, whereas 3% of added ETU was converted to ethyleneurea. A preliminary survey of three commodities indicated that approximately 33% of the samples contained ethyleneurea. (Author abstract reprinted by permission of the American Chemical Society.)

79-0475. Wheeler, W. B.; Thompson, N. P.; Andrade, P.; Krause, R. T. (Pestic. Res. Lab., IFAS, Univ. Florida, Gainesville, FL 32611) **Extraction efficiencies for pesticides in crops. 1. [^{14}C]Carbaryl extraction from mustard greens and radishes.** *J. Agric. Food Chem.* 26(6): 1333-1337; 1978. (11 references)

^{14}C-labeled carbaryl (1-naphthyl *N*-methyl carbamate) suspended in a commercial carbaryl formulation was sprayed on mustard gresns and radishes. At three intervals, post application, the crops were extracted using methanol, acetonitrile, or acetone. Crops were either blended and leached or repetitively blended followed by Soxhlet extraction. Essentially all the extractable radioactivity was removed by blending. The ^{14}C was more difficult to extract from radishes than from mustard greens and with increasing time after application. For mustard greens 92, 83, and 77% of the ^{14}C at harvest was extractable at 3, 7, and 14 days, respectively; for radishes 91, 76, and 58% was extractable at the same intervals. Methanol was generally the best solvent and the blend-Soxhlet process was superior to the blend-leach process. Thin-layer chromatography of the organic soluble extracts indicated that the majority of ^{14}C was carbaryl. Acid hydrolysis of the extracted tissues released 40-50% of the residual ^{14}C. (Author abstract reprinted by permission of the American Chemical Society.)

79-0476. Kissel, C. L.; Brady, J. L.; Guerra, H. M.; Pau, J. K.; Rockie, B. A.; Caserio, F. F., Jr. (Magna Corp., Santa Fe Springs, CA 90670) **Analysis of acrolein in aged aqueous media. Comparison of various analytical methods with bioassays.** *J. Agric. Food Chem.* 26(6): 1338-1343; 1978. (30 references)

The lifetime of acrolein was studied in various buffer systems at pH 5, 7, and 9 at 22°C. Bioassays indicated that the complete hydrolysis of acrolein occurred at the above pH values within 150, 120-180, and 5-40 hr, respectively. The variation in the data for the pH 7 and 9 cases shows a broad range of results when various buffer systems of like pH but unlike composition are compared. Analytical methods involving the conversion of acrolein to a derivative such as 2,4-dinitro phenyl hydrazone (DNPH) or 7-hydroxy quinoline, followed by analysis, did not correlate well with the bioassay data. All derivatization methods gave positive, nonzero values for acolein residuals even though bioassay data were negative. Analytical methods measuring acrolein directly by NMR, direct fluoroscence, and differential pulse polarography correlated well with bioassay data over the range of 1 to 4 acrolein half-lives. Regardless of the analytical method chosen, systems containing tri (hydroxymethyl) aminomethane consistently gave poor correlations with bioassay data. (Author abstract reprinted by permission of the American Chemical Society.)

79-0477. Tafuri, F.; Patumi, M.; Businelli, M.; Marucchini, C. (Cent. Stud. Chim. Antiparassitari, CNR, Inst. Chim. Agrar., Univ. Perugia, I-06100 Perugia, Italy) **Determination of residues of Vitavax and Plantax in grains.** *J. Agric. Food Chem.* 26(6): 1344-1346; 1978. (7 references)

A gas-liquid chromatographic method using a nitrogen- selective detector is described for the determination of Vatavax (carboxin) and Plantvax (oxycarboxin) residues in grains. Vitavax and Plantvax are extracted from the grains and the extract is cleaned up. Gas-liquid chromatography is applied to Plantvax following the formation of the reduced derivative. The structure of the reduced Plantvax is established by NMR and infrared spectra. The recoveries of Vitavax from fortified grains varied from 87.2 to 92.1% in the range 0.01-0.20 mg/kg. The senstivity was such that Vitavax could be detected down to a level of 0.005 mg/kg. Results for Plantvax recoveries showed that the method can be used in grain extracts for levels down to 0.5 ppm for quantitative determination of Plantvax. Below this limit the reduced Plantvax peak rapidly disappearance as concentration diminished. (Author abstract reprinted by permission of the American Chemical Society)

79-0478. King, R. R. (Res. Stn., Res. Br., Agric. Canada, Fredericton, New Brunswick E3B 4Z7, Canada) **Gas chromatographic determination of diquat residues in potato tubers.** *J. Agric. Food Chem.* 26(6): 1460-1463; 1978. (9 references)

A gas chromtographic method is described for the determination of diquat residues in potato tubers by reduction of diquat with sodium borohydride to a volatile diamine derivative. It is demonstrated that reduction with sodium borohydride effectively displaces diquat from both soil and potato tubers without prior acid hydrolysis. After extractive cleanup the diquat derivative could be detected at levels down to 0.01 ppm in potatoes with a nitrogen-phosphorus specific detector. Recoveries of diquat from potatotes at fortification levels of 0.05 to 1.00 ppm averaged 87.4 ± 4.1%. (Author abstract reprinted by permission of the American Chemical Society)

79-0479. Fan, T. Y.; Fine, D. H.* (Thermo Electron Canc. Res. Cent., Waltham, MA 02154) **Formation of *N*-nitroso dimethylamine in the injection port of a gas chromatograph: an artifact in nitrosamine analysis.** *J. Agric. Food Chem.* 26(6): 1471-1472; 1978. (8 references)

Formation of *N*-nitroso dimethylamine (NDMA) was observed during the GC analysis of a commercial herbicide sample formulated as the dimethylamine salt of 2,3,6-trichloro benzoic acid (2,3,6-TBA). The artifactual enhancement was shown to occur when the crude herbicide sample, presumably containing the precursors for the formation of NDMA, was injected into the hot GC injection port. The artifact was eliminated by analyzing the sample (1) after more than eightfold dilution, or (2) after extracting with methylene chloride. (Author abstract reprinted by permission of the American Chemical Society.)

79-0480. Smith, S.; Willis, G. H. (Sci. & Educ. Adm., USDA, Baton Rouge, LA 70893) **Determination of oryzalin in water-sediment systems.** *J. Agric. Food Chem.* 26(6): 1473-1474; 1978. (5 references)

An analytical procedure for determining residual oryzalin at the 1-ppb level in water-sediment (runoff) samples is described in detail and thoroughly evaluated. Using extracting solutions with benzene: methanol ratios ranging from 3:1 to 9:1, we recovered 94-96% oryzalin from fortified water-sediment samples. After derivatization, no cleanup by column chromatography was required using the GC conditions described. (Author abstract reprinted by permission of the American Chemical Society.)

79-0481. Cooke, M.; Nickless, G.; Prescott, A. M.; Roberts, D. J. (Dep. Inorg. Chem., Univ. Bristol, Bristol BS8 1TS, England) **Analysis of polychlorinated naphthalenes, polychlorinated biphenyls and polychlorinated terphenyls via carbon skeleton gas-liquid chromatography.** *J. Chromatogr.* 156(2): 293-299; 1978. (14 references)

Mixtures of polychlorinated naphthalenes (PCN's), polychlorinated biphenyls (PCB's) and organochlorine pesticides have been determined by carbon skeleton gas chromatography (GC). Polychlorinated terphenyls (PCT's) have also been investigated. Using hydrogen as the carrier gas, on-column catalytic reduction of PCN's to naphthalene was quantitative for a 3% palladium catalyst at 305°. PCB's were reduced to biphenyls and PCT's to a mixture of *o*-, *m*-, and *p*-terphenyl under similar conditions. PCB's and PCN's were also analysed successfully on a 5% platinum catalyst at 180°

The products of catalytic reduction were identified by GC-mass spectrometry. The method allows detection of nanogram quantities of polychlorinated species. (Author abstract by permission)

79-0482. Ali, S. L. (Zentrallab. Deutsch. Apotheker, D-6236 Eschborn, BRD) **Determination of hexachlorocyclohexane pesticide residues in wool fat by a combined high-performance liquid chromatographic gas-liquid chromatographic method.** *J. Chromatogr.* 156(1): 63-70; 1978. (14 references)

β- and γ-Hexachlorocyclohexane, (BHC and lindane, respectively), residues were determined in twelve wool fat samples by using a combined high performance liquid chromatographic (HPLC) gas-liquid chromatographic (GLC) method. After extraction and chromatographic clean-up on a silica-gel column, the sample was further purified by HPLC on a reversed-phase C-18 column with methanol as the mobile phase. The final determination was effected by GLC with a 1-mCi nickel-63 electron-capture detector. The analytical method was checked by addition of ^{14}C-labeled lindane and measurement of the radioactivity in a liquid scintillation counter. (Author abstract by permission)

79-0483. Lamparski, L. L.; Nestrick, T. J. (Anal. Lab., Michigan Div., Dow Chem. Co., Midland, MI 48640) **Deter-**

mination of trace phenols in water by gas chromatographic analysis of heptafluorobutyryl derivatives. *J. Chromatogr.* 156(1): 143-151; 1978. (13 references)

An analytical procedure is described that permits the determination of phenol and substituted phenols, which do not posses inherent electron-capture sensitivity, at concentrations ≥ 10 ng/ml in aqueous media by gas chromatographic analysis of the heptafluorobutyryl derivatives. Sample pre-concentration is not required, and a single benzene extraction removes phenolics from the water matrix prior to derivatization. The gas chromatographic analysis is performed on a column packing which exhibits high efficiency and low column bleed. These characteristics allow the determination of a large number of components in a single temperature programmed electron-capture gas chromatographic analysis in less than 15 min. Recoveries of ten phenolics at the 20-200 ppb level are *ca.* 75% or greater. (Author abstract by permission)

79-0484. Lawrence, J. F.; Turton, D. (Food Res. Div., Health Prot. Branch, Ottawa, Ont. K1A 0L2, Canada) **High-performance liquid chromatographic data for 166 pesticides.** *J. Chromatogr.* 159(2): 207-226; 1978. (42 references)

High-pressure liquid chromatographic data of 166 pesticides and related compounds are tabulated. Included are chromatographic conditions such as type of packing material, column dimensions and mobile phase composition. Elution volumes or capacity factors are listed as a measure of compound retention. The types of substrate and detectors used for the analysis are also included. Where UV detectors were employed, the wavelength used is also given. (Author abstract by permission)

79-0485. Crist, H. L.; Moseman, R. F. (Health Effects Res. Lab., Environ. Toxicol. Div., Anal. Chem. Branch, US EPA, Research Triangle Park, NC 27711) **Application of the Hall detector and a surface-bonded carbowax 20M column to analysis of organochlorine pesticides in human biological samples.** *J. Chromatogr.* 160(1): 49-58; 1978. (18 references)

An evaluation of a gas chromatographic electrolytic conductivity detector system (Hall detector) was conducted for the determination and confirmation of selected organochlorine pesticides at sub-ppm concentration levels in human biological extracts. The sample extracts were also analyzed with electron capture gas chromatography for comparison purposes. The linear regression lines for both sets of data were calculated by the least squares method. A high degree of correlation between the data sets was found. Also evaluated as part of the electrolytic conductivity detector system was a column with Carbowax 20M bonded to the surface of the support. The effect of repeated injections of extracts with a high content of lipids on the performance of the Hall detector and column was investigated. Gel-permeation chromatography was found to be valuable as a technique for additional clean-up of certain extracts having an adverse effect on the performance of the Hall detector due to excessive lipid material. (Author abstract by permission)

79-0486. Mallet, V. N.; Brun, G. L.; MacDonald, R. N.; Berkane, K. (Dep. Chim., Univ. Moncton, Moncton, New Brunswick, Canada) **A comparative study of the use of XAD-2 resin and the conventional serial solvent extraction procedure for the anlaysis of fenitrothion and some derivatives in water preservation techniques.** *J. Chromatogr.* 160(1): 81-88; 1978. (7 references)

An analytical technique using the macroreticular resin XAD-2 for recovering fenitrothion, fenitrooxon and amino fenitrothion in water is described. The procedure was evaluated directly in the field immediately after an aerial application of the solvent extraction method. It was also found that water samples containing fenitrothion and the two derivatives could be processed on XAD-2 columns and that the chemicals would be stabilized for at least 6 days. The parent compound and its two degradation products were monitored in samples of natural river water but only the parent compound was detected. (Author abstract by permission)

79-0487. Pflugmacher, J.; Ebing, W. (Inst. Pflanzenshutzmittelforsch., Biol. Bundesanst. Land. & Forstwirtschaft, D-1000 Berlin, BRD) **Die Reinigung von Pflanzenextrakten zur Bestimmung von Pflanzenschutz mittelrueckstanden mit Hilfe eines automatishen Gelchromatographen. [Purification of plant extracts for determination of pesticide residues by means of an automatic gel chromatograph.]** *J. Chromatogr.* 160(1): 213-220; 1978. (6 references) (German)

An automatic gel chromatograph is described enabling the analyst unattended by even a few general methods, to solve various clean-up problems in pesticide residue analysis. Although analysis time is relatively long, labour is saved and a 24-hr day is at the disposal of the analyst. Two general methods for clean-up and residue determination of organophosphorus and carbamate compounds in several crop plants are described. Recovery values range between 82 and 104% and are similar or better than results obtained manually. (Author abstract by permission)

79-0488. Sodergren, A. (Inst. Limnol., Univ. Lund, S-22003 Lund, Sweden) **Simultaneous detection of halogenated and other compounds by electron-capture and flame-ionization detectors combined in series.** *J. Chromatogr.* 160(1): 271-276; 1978. (5 references)

An apparatus was constructed to allow for the simultaneous detection of halogenated organics as well as other environmental pollutants. The method combined an all-glass ECD and an FID to a Varian 2700 gas chromatograph. Since ECD is a non-destructive process, the analyte sample passes undisturbed on to the FID via glass capillary tubing. A low volume detector was developed for use in the ECD which is sensitive to solute concentration. A cell volume of 0.15 ml was achieved by modifying the arrangement of the tritium foil in the ECD cell so that the sensitivity of the detector was comparable to the conventional ECD detection sensitivities. This new method was used to monitor the degradation and fate of pollutants in model aquatic ecosystems. Other test systems have demonstrated the usefulness of the method in

detecting mineral oil residues in aquatic environments where PCB's are prevalent. Combined ECD-FID detection may also be utilized in the simultaneous detection of organochlorine pesticides and methyl esters of fatty acids. Lindane, BHC, aldrin, DDE, TDE, dieldrin, and DDT have been distinguished from lauric, myristic, palmitic, stearic, and oleic acids in samples where these organochlorine pesticides and esters have been combined in mixtures. The accuracy of the combined ECD-FID detection is comparable to that of each method employed separately.

79-0489. Erney, D. R. (FDA, Detroit, MI 48207) **Gas-liquid chromatographic determination of pentachlorophenol in milk.** *J. Assoc. Off. Anal. Chem.* 61(1): 214-217; 1978. (2 references)

A gas-liquid chromatographic (GLC) method developed by other workers for determining pentachlorophenol (PCP) in water has been adapted for determining PCP in raw and homogenized milk. PCP is extracted from milk with benzene and from the benzene into a potassium carbonate solution. Acetic anhydride is added to the aqueous solution to form PCP acetate, which is extracted into hexane and then determined by electron capture GLC. Duplicate determinations of PCP in milk fortified at levels of 0.02, 0.2, and 2.0 ppm gave respective average recoveries of 80.0, 87.2, and 85.0%. PCP levels as low as 0.005 ppm can be detected in 20 g milk. (Author abstract by permission)

79-0490. Stevens, T. S.; Skelly, N. E.; Grorud, R. B. (Anal. Lab., Michigan Div., Dow Chem. Co., Midland, MI 48640) **Isomer specific assay of ester and salt formulations of 2,4-dichloro phenoxy acetic acid by high pressure liquid chromatography: collaborative study.** *J. Assoc. Off. Anal. Chem.* 61(5): 1163-1165; 1978. (4 references)

A high pressure liquid chromatographic (HPLC) assay of ester and salt formulations of 2,4-D has been collaboratively studied. The method is specific for 2,4-D isomer and resolves all known impurities from 2,4-D and the internal standard *p*-bromophenol. *In situ* saponification, at room temperature, is performed by adding a combined saponification internal standard solution to ester products. The same saponification internal standard solution is added to amine salts and the analytical standard. The injected aqueous potassium salt solution of 2,4-D is then converted to the acid form by an acidic buffered mobile solvent of 20% acetonitrile in water. Optimum chromatography is attained by a mobile solvent pH of 2.95 in a reverse phase microparticulate column, by ion suppression. Each of the 9 collaborators received 3 different ester and 2 different amine formulations of 2,4-D. The coefficients of variation of 2,4-D acid equivalent ranged from 1.22 to 1.59%. The method has been adopted as official first action. (Author abstract by permission)

79-0491. Wu, A.; Lech, J. J.; Glickman, A.; Pearson, M. L. (Dep. Environ. Med., Med. Coll. Wisconsin, Milwaukee, WI 53226) **Mass fragmentographic determination of pentachlorophenol in rainbow trout.** *J. Assoc. Off. Anal. Chem.* 61(5): 1303-1306; 1978. (13 references)

Pentachlorophenol (PCP) is extracted from selected tissues of rainbow trount and converted to pentachloroanisole (PCA) by means of alkylation in the presence of potassium carbonate as a condensing agent. Pentachloro phenetole (PPT) is used as an internal standard. The electron impact mass fragmentography is carried out by monitoring m/e 280 (PCA), 294 (PPT), and 237. A plot of peak height vs. concentration is linear from 0.03 to 4.0 ng. Accuracy and precision of the method is $\pm$ 2% ($N = 36$). The results are accurate enough to warrent the use of this method for determining PCP in fish, as well as for monitoring PCP from various environmental sources. In addition, this technique provides a simple and rapid method by which a mixture of PCA and PCP can be determined simultaneously. (Author abstract by permission)

79-0492. Yamato, Y.; Suzuki, M.; Watanabe, T. (Kitakyushu Munic. Inst. Environ. Health Sci., Kitakyushu 804, Japan) **Extraction of benzene hexachloride isomers from water samples, using a macroreticular resin.** *J. Assoc. Off. Anal. Chem.* 61(5): 1135-1139; 1978. (9 references)

Four BHC isomers added to 3 L BHC-free distilled water at levels of 1.0, 0.1, and 0.01 ppb were quantitatively recovered (> 94%), using an amberlite XAD-2 resin. Gas-lqiuid chromatography with electron capture detection and a column packed with 2% Apiezon L on 100-120 mesh Gas-Chrom Q was used as a determinative step. This method was also used to detect BHC residues in tap water and river surface waters in the Kitakyushu District, Japan. The 4 BHC isomers were detected at levels below parts per trillion in almost all the samples analyzed: α-BHC > β-BHC > γ-BHC > δ-BHC. The maximum residue level of total BHC was 0.604 ppb and the minimum was 0.007 ppb. The minimum detectability for total BHC in a 3 L water sample was 0.001 ppb. (Author abstract by permission)

79-0493. De Beer, J. O.; Van Peteghem, C. H.; Heyndrickx, A. M. (State Univ. Ghent, Dep. Toxicol., B-9000 Ghent, Belgium) **Pentafluorobenzyl ester derivatives of nine chlorophenoxy acid herbicides: spectroscopic properties and utility for identification purposes.** *J. Assoc. Off. Anal. Chem.* 61(5): 1150-1154; 1978. (9 references)

The pentafluorobenzyl esters of 9 chlorophenoxy acid herbicides were synthesized by the reaction of the acids with pentafluorobenzylbromide in alkaline acetone solution. Ultraviolet (UV), infrared (IR), proton magnetic resonance (PMR), and mass spectra (MS) were recorded. IR and mass spectra are shown and UV, PMR, and MS data are tabulated and discussed. A technique for extraction of the chlorophenoxy alkyl acid herbicides, followed by conversion to the corresponding pentafluorobenzyl esters, was developed for human urine samples. Applications in different concentration ranges (ppm, ppb) by different spectroscopic techniques (MS, IR) are demonstrated. (Author abstract by permission)

79-0494. Helfant, L. J. (Amchem. Prod. Inc., Ambler, PA 19002) **Collaborative study of the gas-liquid chromatographic determination of bromoxynil octanoate in formulations.** *J. Assoc. Off. Anal. Chem.* 61(5): 1158-1162; 1978. (5 references)

The determination of bromoxynil octanoate by a gas-liquid chromatographic (GLC) method with di-*n* -butylphthalate as internal standard was subjected to testing by 10 collaborators. The standard deviation for bromoxynil octanoate and bromoxynil octanoate-MCPA (2-methyl- 4-chlorophenoxy acetic acid) ester formulations averaged 0.6%. While the deviation indicates that the method is statistically sound, the results were dependent upon the efficiency of the GLC column. Therefore, it is recommended that the method be subjected to continued study to further determine the GLC conditions necessary for improved method reliability. (Author abstract by permission)

79-0495. Krasnykh, A. A.; Shvets, D. A. (All-Union Sci. Res. Inst. Plant Prot., Leningrad, USSR) **Khromatograficheskoe opredelenie pirimora v ovoshchakh. [Chromatographic determination of pirimor in vegetables.]** *Khim. Sel'sk. Khoz.* 16(6): 41-42; 1978. (Russian)

A thin-layer chromatographic method for the determination of pirimor (pirimicarb) in vegetables is described. After extraction with diethyl ether, and chromatographic clean-up on alumina, the sample is eluted with chloroform, and applied on silica gel plates in benzene: chloroform (1:1) atmosphere. The plate is then transferred into *n*-hexane: isopropyl alcohol (5:2). The spots are visualized by means of bismuth nitrate, ninhydrine, or UV light. The recovery rate is 80-95%; the sensitivity is 2-5 μg/sample.

79-0496. Balinova, A. (Inst. Plant Prot., Kostinbrod, Bulgaria) **Opredelenie metribuzina i ego metabolitov v rasteniyakh i pochve. [Determination of metribuzin and its metabolites in plants and soil.]** *Khim. Sel'sk. Khoz.* 16(7): 74-75; 1978. (10 references) (Russian)

A method for determining metribuzin and its metabolites in plants and soil is described. Following extraction with acetonitrile, reextraction with chloroform, and thin-layer chromatographic separation in silicagel HF-254, using benzene and ethyl acetate (7:3) as a solvent system, and UV irradiation for visualization, the spots are scraped off, and the active agent eluted with ethyl acetate: diethyl ether mixture (1:1). Metribuzin and its metabolites, separated on the silica gel layer, are determined by means of gas chromatograph with electron capture detector, using diatomite CQ filling with 10% QF-1. The retention time of metribuzin is 3 min 40 sec; that of 3-methylthio 6-*tert*- butyl- 1,2,4-triazinon-5-e (DA), 5 min 25 sec; that of 4-amino-6-*tert*- butyl-1,2,4-triazinedion- 3,5,e (DK), 3 min 12 sec, and that of 6-*tert*-butyl- 1,2,4-triazinedion- 3,5,e (DADK), 1 min 59 sec. The senstitivity is 0.002 mg/kg for metribuzin, 0.005 mg/kg for DA, 0.01 mg/kg for DK, and 0.1 mg/kg for DADK.

79-0497. Kobayashi, H.; Matano, G.; Goto, S. (Inst. Environ. Toxicol., Kodaira, Tokyo 187, Japan) **Gas chromatographic determination of guanidino fungicide, guazatine, in rice grain.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 2(4): 427-430; 1977. (4 references)

Erdtmansky's method of residue analysis of disubstituted guanidino- containing fungicide, guazatine, was undertaken in rice grains. This is a gas chromatographic method for analysis and calls for the extraction from the rice grain of the substance to be determined with 0.5*N* NaOH: MeOH partitioned into chloroform, and then treatment with hexafluoro acetylacetone. This treatment yields bis (3,5- (trifluoromethyl) pyrimidyl-1-amino)- 8,8′-dioctylamine. FTD gas chromatography was then used to determine the pyrimidine analog of guazatine. The method has a lower limit of detection of 1 ng, which corresponds to 0.05 ppm in a 5 g sample. The overall average recovery from the rice grain was about 90%.

79-0498. Goto, S. (Inst. Environ. Toxicol., Kodaira, Tokyo, Japan) **[Methods for determination of pesticide residues based on the notification of environmental agency. Part 2. Fungicides and herbicides.]** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 3(3): 315-325; 1978. (Japanese)

Methods for the analytical determination of pesticide residues are summarized for a number of fungicides, herbicides, and other agricultural chemicals. The Japanese Environmental Agency standards are also included as well as outlines for suspending registration of the chemical by the agency. Some of the fungicides discussed are: anilazine, amobam, quinomethionate, fentin acetate, fentin hydroxyide, captafol, milneb, thiophanate, thiophanate methyl, binapicryl, phthalide, benomyl, zineb, ziram, mancozeb, dichloran, quintozene, and chlorthalonil. The herbicides discussed included: atrazine, ametryne, diquat dibromide, terbacil, trifluralin, paraquat dichloride, prometryne, simazine, 2,4-D, chlorthiamide, diuron, propanyl, chlorprofam, and nitrofen.

79-0499. Isshiki, K.; Tsumura, S.; Watanabe, T. (Kita-Kyushu Munic. Inst. Environ. Health Sci., Kita-Kyushu, Fukuoka, Japan) **[Analytical method of piperonyl butoxide in agricultural products. III. Impurities in piperonyl butoxide.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jpn.)* 19(3): 311-317; 1978. (12 references) (Japanese)

Impurities of piperonyl butoxide are found in products such as commercial food additives, standard specimens for analysis, chemical reagents and agricultural synergists. Specimens of these products were examined by fractionation with column- and thin layer chromatography, gas-chromatography, elementary analysis and spectroscopy by FD-Mass, EI-Mass, IR and NMR. In 4 kinds of the above-mentioned samples, the content of piperonyl butoxide ranged from 80.5 to 98.6%. The following 5 compounds were detected as impurities: 6-hydroxymethyl dihydro- safrole, 6-propylpiperonyl *n*-butylene glycol ether, 2-propyl-4-, 5-dimethoxybenzyl *n*-butyl diethylene glycol ether, bis (2-propyl- 4,5-dimethoxyphenyl) methane, and di (2-propyl- 4,5-di methoxybenzyl) ether.

79-0500. Mestres, R.; Chevallier, Ch.; Espinosa, Cl.; Cornet, R. (Lab. Chim. Appl., Fac. Pharm., F-34060 Montpellier, France) **Dosage des residus de decamethrine dans les produits vegetaux. [Analytical determination of decamethrin residues in crops.]** *Trav. Soc. Pharm. Montpellier* 38(2): 183-191; 1978. (5 references) (French)

Analytical methods for the determination of residues of the synthetic pyrethroid, decamethrin in various crops are described. For residues of 0.02 to 0.1 mg/kg the recovery is 85-100%. The procedure recommended for crops with a low fat content (peaches, apples, grapes, tomatos) involves extraction with acetonitrile, purification with acetonitrile petroleum ether, adsorption chromatogrpahy on florisil and analysis by gas chromatography (all methods). Crops containing fatty materials (cocoa, coffee, cotton, olives, soybeans, grains) call for extraction with petroleum ether/ ethyl ether, followed by separation with acetonitrile/ petroleum ether, adsorption chromatogaphy on florisil and subsequent gas chromatography. Cherries can be analyzed by adsorption by alumina chromatography following simple extraction with petroleum ether/ ethyl ether.

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